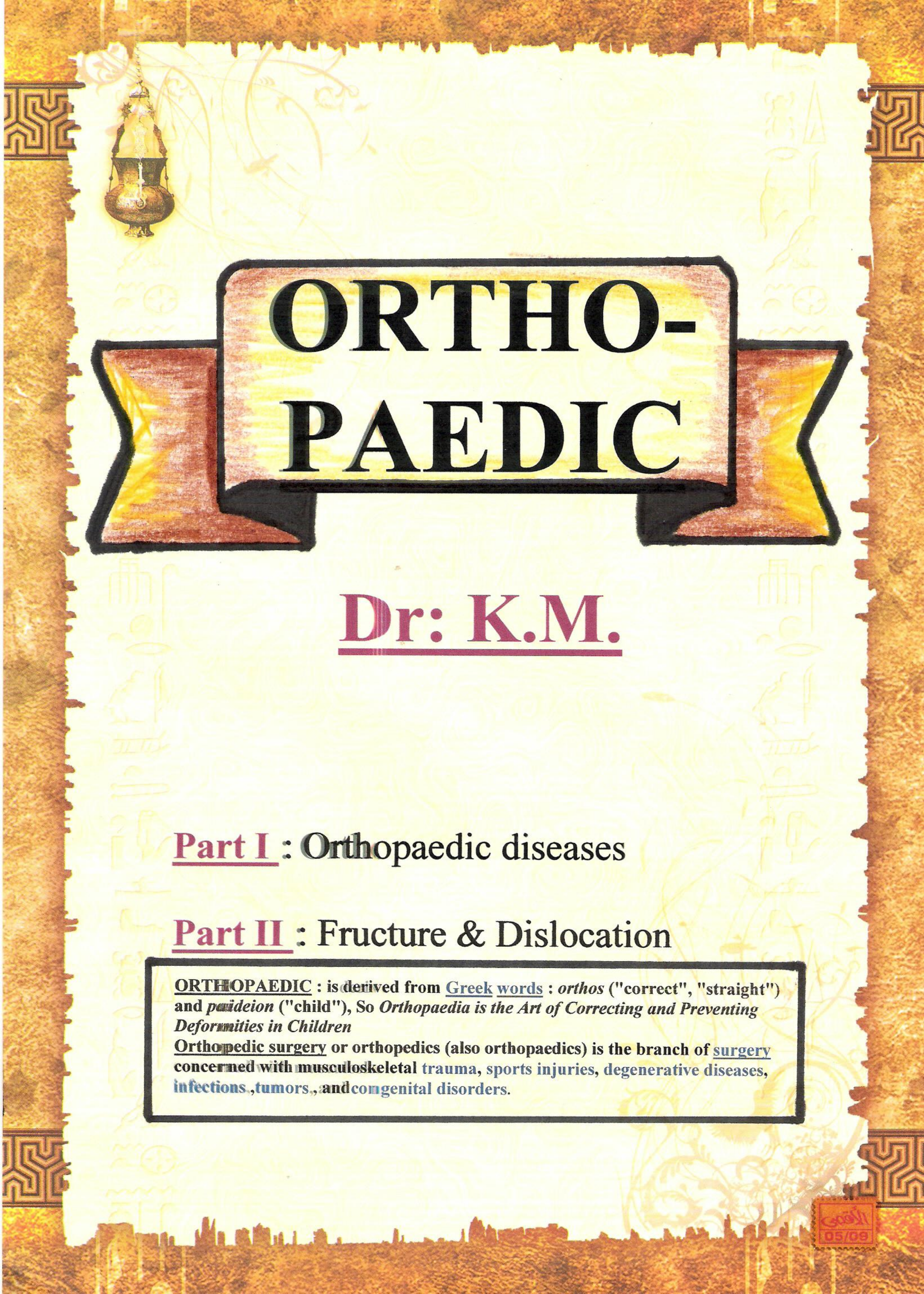




ORTHO- PAEDIC

Dr: K.M.

Part I : Orthopaedic diseases

Part II : Fracture & Dislocation

ORTHOPAEDIC : is derived from Greek words : *orthos* ("correct", "straight") and *paideion* ("child"), So *Orthopaedia is the Art of Correcting and Preventing Deformities in Children*

Orthopedic surgery or orthopedics (also orthopaedics) is the branch of surgery concerned with musculoskeletal trauma, sports injuries, degenerative diseases, infections, tumors, and congenital disorders.

VISIT...

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Part II

FRACTURE & DISLOCATION

Dr. K.M.

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Fractures & Dislocations

Dr. K.M.

د. خالد ميلاد



* Definitions :-

- Fracture :- Complete or incomplete break in ^{bone} cortex continuity.
- Dislocation :- Complete loss of contact between parts of a joint
- Subluxation :- incomplete (partial) dislocation.
- Displacement :- separation of the 2 ends of broken bone.

* Healing of fracture "union" :-

1. hematoma formation stage
2. cellular proliferation.
3. new bone formation (osteoblast).
4. consolidation
5. remodelling (osteoclast)

stages of healing

- 0-3 wk → hematoma + MQ
- 3-6 wk → osteoclast + callus
- 6-12 wk → bone formation in callus
- 6-12 m → cortical gap is bridged by bone
- 1-2 yr → remodelling (normal architecture)

Toronto notes

* factors affecting healing : (delayed union)

1. age (↑ age → delays healing).
2. infection → delay healing.
3. Bone disease : → infection, tumour, ... etc (delay healing)
4. general health → low immunity, HIV, DM, ... etc .. "
5. interposition of soft tissue → delay healing
6. Blood supply (↓ B. supply → delay healing)
7. inadequate immobilization (↑ movement → delay healing).
8. avascular necrosis (osteonecrosis)
9. Pathological fracture (diseased bone ✖ due to minor trauma).

NB :- Avascular necrosis (AVN) :- occurs in bones largely covered by cartilage or bones only supplied from distal to proximal.

e.g :- scaphoid, femoral head, body of talus

- also in navicular & Lunate due to osteochondritis.

- x-ray → radiodense "sclerosis"
- MRI > sensitive than x-ray in early

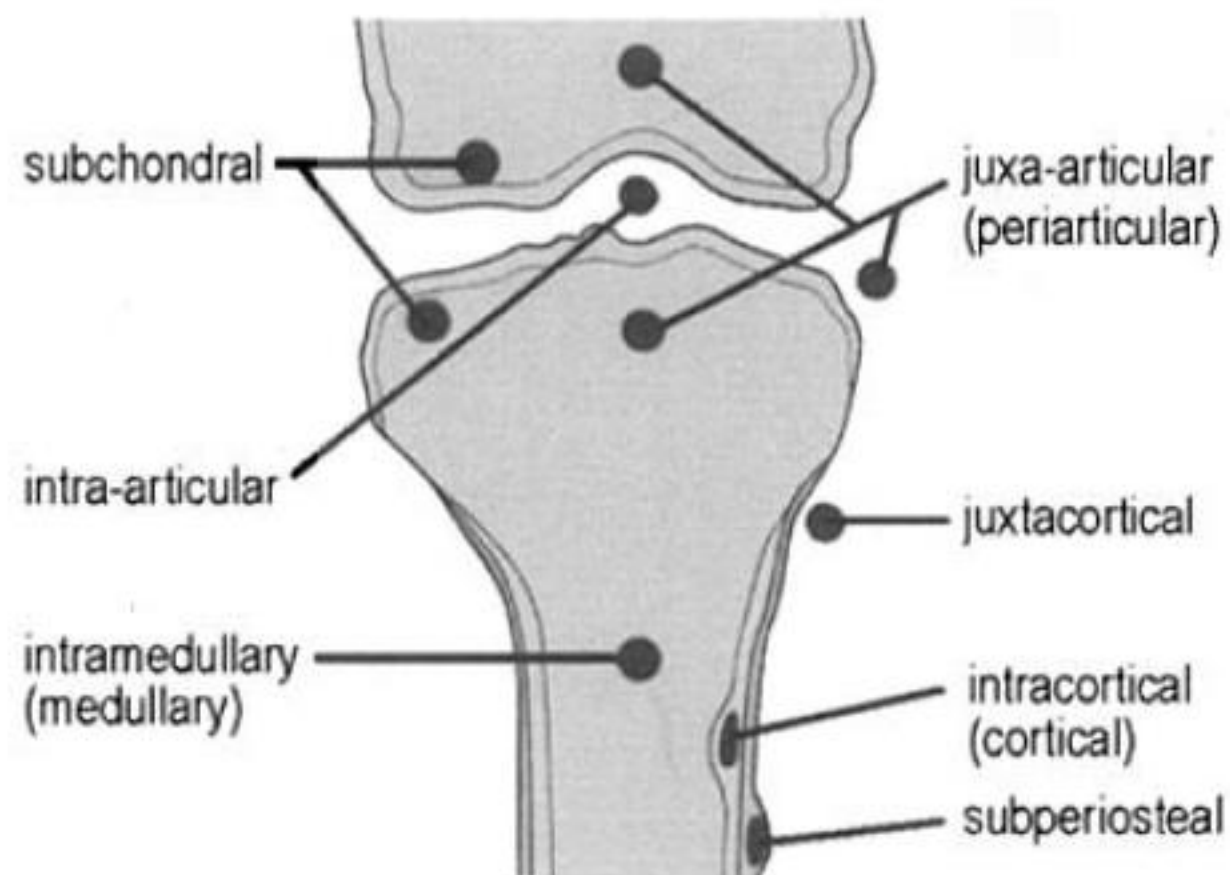


Figure 2.1

Terminology used to describe the different portions of a long bone.

(from Greenspan A, *Orthopedic Radiology* 2nd ed, Raven Press 1992, with permission)

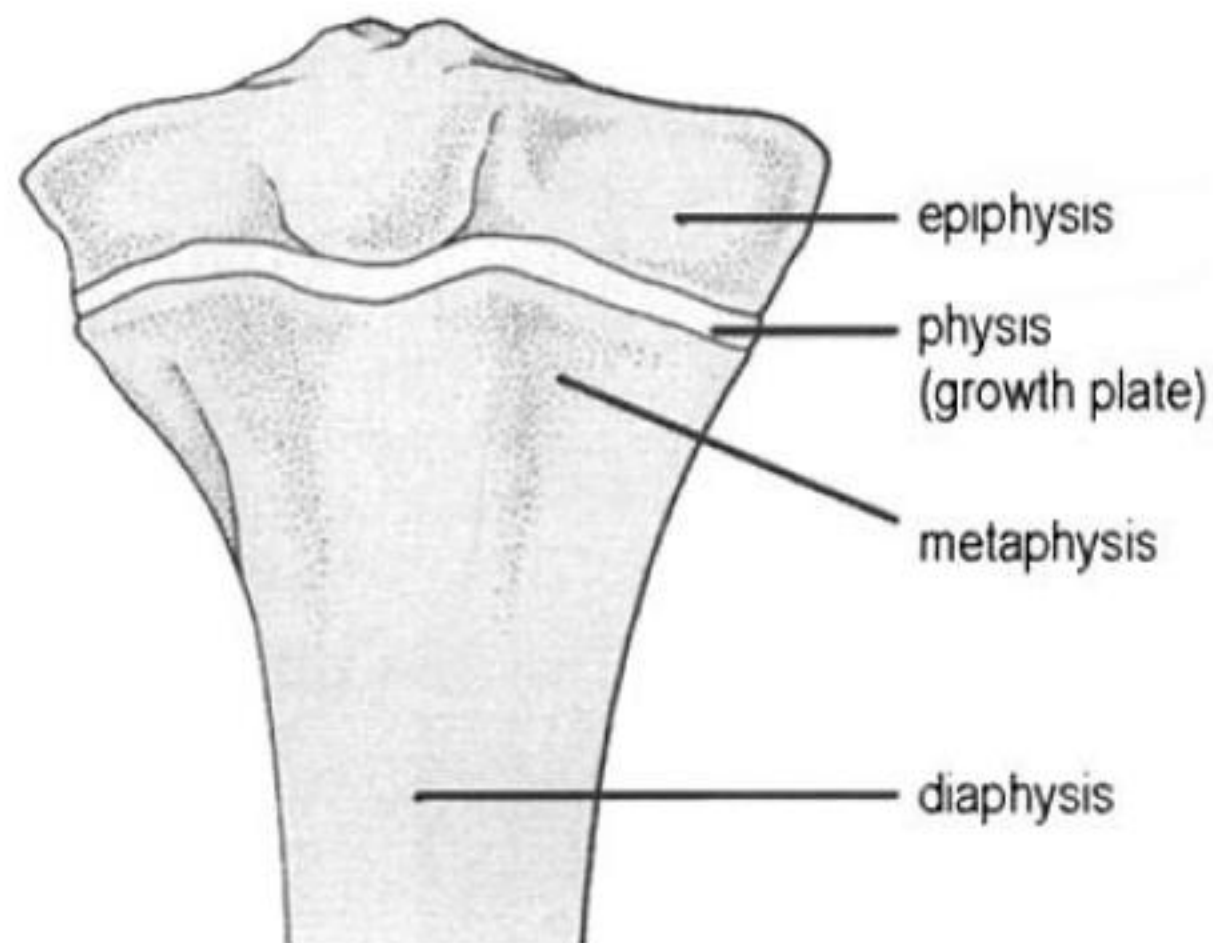


Figure 2.2

Terminology used to identify the location of a lesion in the long bone of the growing skeleton. At maturity (post-skeletal fusion) the physis (growth plate) fuses and is no longer visible.

(from Greenspan A, *Orthopedic Radiology* 2nd ed, Raven Press 1992, with permission)

* Test of union :-

[A] radiologically :- callus formation.

[B] Clinically :- 1- immobility of fragments of fractured bone.
2- absence of tenderness on deep palpation.
3- angulation stress (pressure) → ~~Not~~ pain

* N.B :- Union (healing) is suspected by 3 months (differs according to age, bone affected, ... etc).

- If no healing by > 3 months but < 6 m → Delayed union
- If no healing by > 6 m. → Non-union

- Types of non-union are ① atrophic non-union. (no callus)
② oligotrophic non-union. (limited callus)
③ hypertrophic non-union. (extensive callus)

pseudarthrosis
"false joint"

* Classifications of fracture :-

[A] According to aetiology :-

- 1- Traumatic * :- direct or indirect trauma.
- 2- Pathological * :- * of diseased bone due to minor trauma
e.g osteomyelitis, tumour, rickets, etc.
- 3- Stress (fatigue) * :- fracture due to repeated minor trauma.
e.g March * "metatarsal bone".

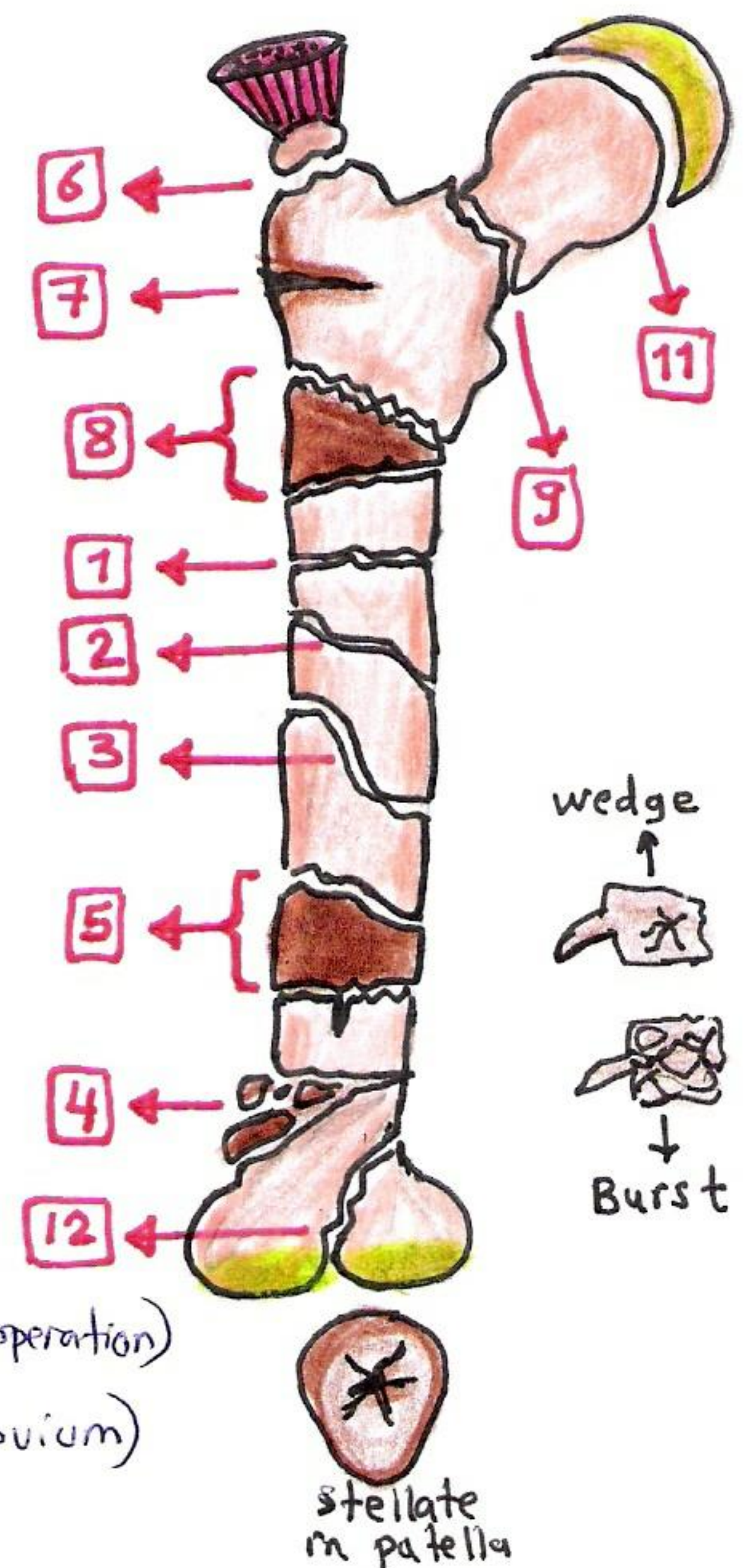
• NB : most common cause of pathological * is secondary malignancy commonly in upper half of femoral shaft.

[B] According to skin integrity :-

- 1- Simple (closed) * :- skin overlying fracture is intact.
- 2- compound (open) * :- communicated bone with exterior
 - there is high risk of infection.
 - needs external fixation.

C] According to shape :-

- 1- Transverse ✖. (caused by direct force),
- 2- Oblique (angular or rotational force).
- 3- Spiral. (rotational force).
- 4- Comminuted. (more than 2 fragments)
- 5- Segmental. (separate segment)
- 6- avulsion.
- 7- green stick: (incomplete ✖ of one cortex) common in children.
- 8- Butterfly
- 9- impacted
- 10- stellate
- 11- epiphyseal separation
- 12- intra articular (crosses articular cartilage) (need operation)
↳ (No hematoma due to lytic enzymes in synovium)



D] According to movement :-

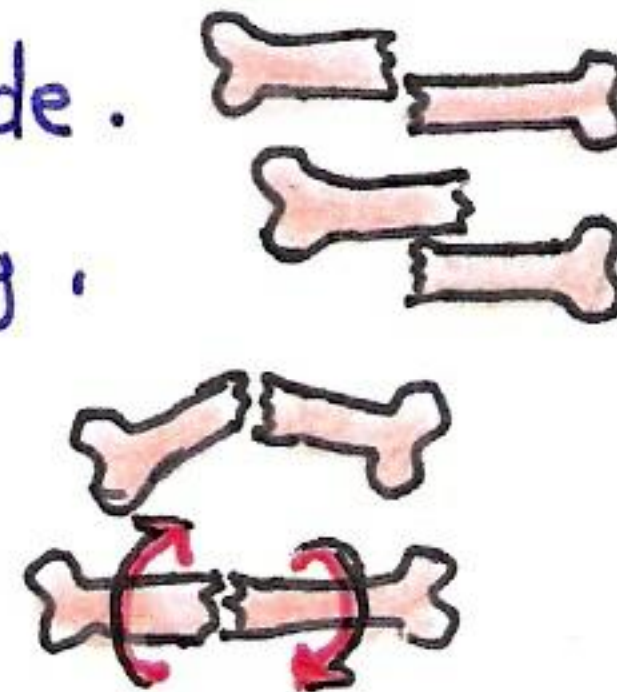
- 1- Un displaced ✖ :- fracture fragments are in anatomic alignment
- 2- Displaced ✖ :- occurs mainly with spiral or oblique ✖.

types are :- Side to side.

- over-riding.

- angulation.

- rotation.



E] According to stability :-

- 1- stable :- remains in position after reduction.
- 2- Unstable displaced after reduction. (needs internal fixation)

* Gustilo classification of compound ✖

Toronto notes

Grade	length of wound	description	Antibiotic regimen
I	< 1cm	minimal contamination & soft tissue injury	cephalosporin 48 hr
II	1-10 cm	moderate " " " "	gentamycin ≥ 72 hr
III	> 10 cm	Gross " " " "	penicillin (clostridial cover)

Grade III include - high energy injury, comminuted ✖, shotgun blast, soil contamination, & ✖ > 8 hrs duration. (3)

Gustilo classif. :

Tupe I :low energy injury, small clean wound(<1cm)

Tupe II :low energy injury, usually clean wound of >1cm

Tupe III :high energy injury, extensive skin and soft tissue damage with contamination

IIIa : bone can be adequately covered by soft tissue

IIIb : bone can not be covered with periosteal stripping

IIIc : associated with arterial injury that needs surgery

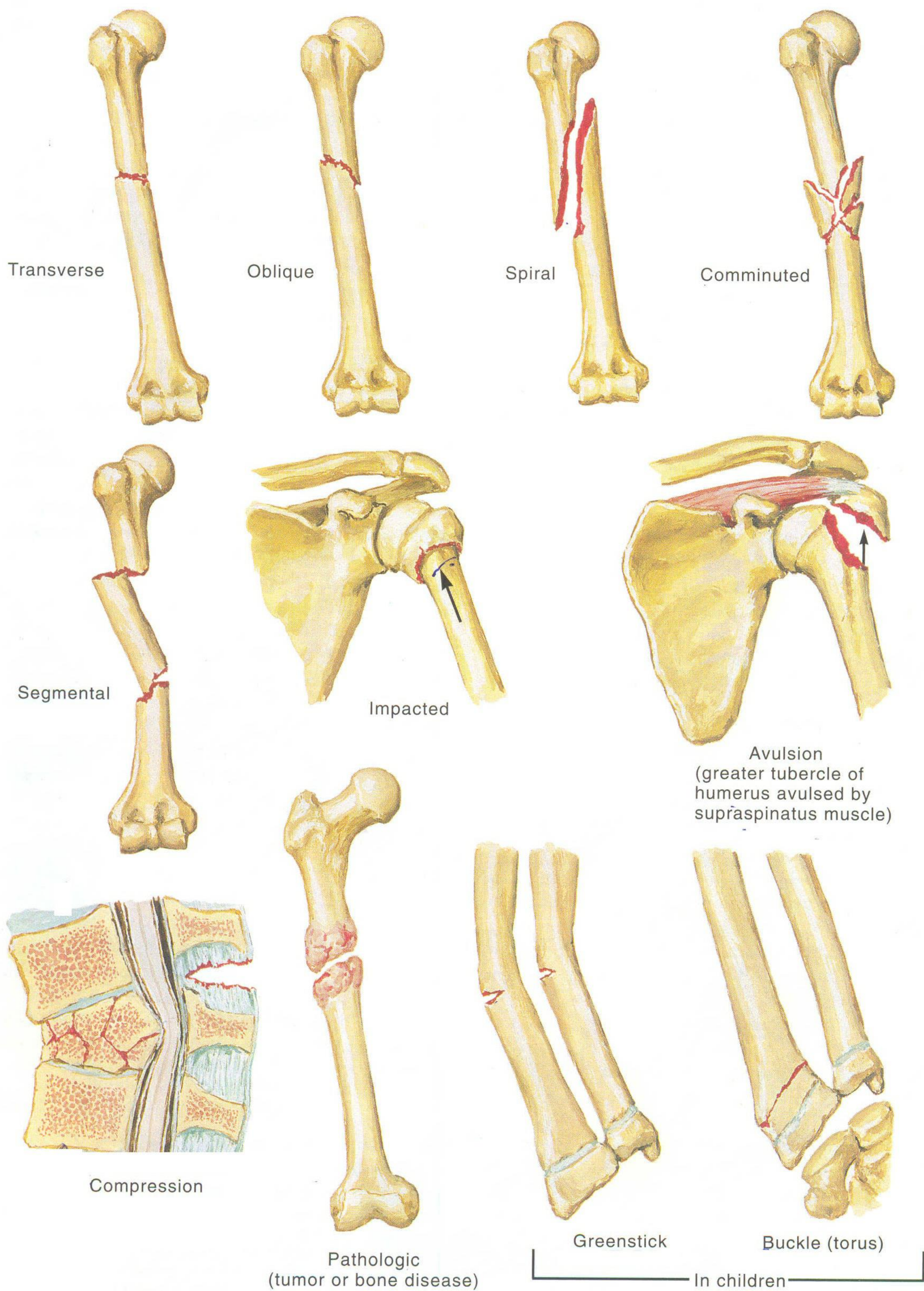
(د.سمیر صقر)

electropolished stainless steel (EPSS) or standard, non-polished titanium-aluminum-niobium (TAN).

Polishing the surface of TAN IM nails has been shown to reduce bony adhesion and ease implant removal without compromising fixation.

a

Fracture Patterns



* Clinical Picture of * :-

- History :- sever pain, inability to move, swelling, deformity.
- O/E :- - swelling, deformity, ecchymosis & ^{marked local} tenderness
- inability to move, abnormal mobility may elicited.
- S/S of complications :- e.g - arterial injury (6 P), nerve injury,etc
- shock (hypovolemic) [in * femur at least
1 L of blood lost]

* Diagnosis :-

- After history & examination, x-ray AP/Lat.

* Rule of 2 in x-ray :-

2 sides = bilateral 2 views = AP + Lat. 2 joints = above & below
2 times = before & after reduction.

Toronto notes

* Treatment of fracture :-

[A] compound *

- Preoperative :- - resuscitation if needed (ABC),
 - cover the wound w clean sterile dressing & splint the limb.
 - give analgesia (morphin 15 mg IV or IM)
 - I.V fluid (or blood) if needed
 - prophylactic antibiotic
 - antitetanus (booster dose of toxoid if pt immunised,
if not; give a dose followed 6 wk later by a second dose)
- Operative :- - good cleaning with removal of dirt & irrigate w saline.
 - excision of edges of wound.
 - Divide the deep fascia longitudinal along the wound.
 - irrigate w saline, remove contaminations, FB
 - excision of dead tissues & ms until they bleed.
 - remove small, detached fragments of the bone.
 - vessels either ligated or sutured, also nerves & tendons
 - Wound is left open (especially if > 8 hr & contaminated
ie Gustilo III) & covered w vaseline gauze & do
dressing, Later delayed 1st or 2nd stitching when the
wound is clean. [if wound not contaminate or < 6h → 1st stitch]

Non-Union

An atrophic non-union

is one in which no bone growth is occurring. There is usually a lack of vascular (blood) flow at the site hindering growth. No external callous is seen. The bones may become pencil-shaped on x-ray due to resorption of the bone ends. This type of fracture usually requires a surgical procedure to use a [bone graft](#) to promote healing.

An oligotrophic non-union

the external callous is limited but some exists. This type of non-union also would require a bone graft for healing.

Hypertrophic non-unions

have excessive callous formation with adequate blood supply for healing. Healing may be hindered in this type of fracture if it is not stabilized and not given a chance to heal. Typically immobilization with a cast or surgical stabilization is needed for complete healing.

A pseudoarthrosis

is much like a hypertrophic non-union, except that a false joint has been formed where a cartilaginous cap is formed over the ends for the fracture fragments or fibrous tissue interposed between them. Just stabilizing the bones would not be adequate for healing as the cartilage or soft tissue must be removed for end to end bone contact.

- compound bone ✖ is fixed by external fixation (risk of infection if internal fixation "FB").

- Post-operative - elevate the limb, antibiotic, analgesic
- check circulation of limb in next 36 hr "compartment syndrome"
- after 7-10 days if no infection → delayed 1st stitching.
- Late ttt as nerve & tendon repair, skin or bone graft.
- External fixation indicated in ① compound ✖

- ② comminuted ✖
- ③ Poly trauma
- ④ infection.

B Simple fracture :-

• FIRST AID :- (if suspected fracture) :-

- Lower limb → the two limbs bandaged together or the limb to wood back-splint.
- Upper limb → bandaged to chest.
- Spine ✖ → pt lifted bodily on to a firm surface.
- neck ✖ → collar or avoid flexion & extension of spine.

• HOSPITAL ttt :-

- principles are :- reduction, immobilisation & rehabilitation.

① REDUCTION :-

a) Closed reduction :-

- usually ^{manipulation} under G.A, by traction along axis of limb

b) reduction by mechanical traction :-

- it is a subtype of closed reduction.
- done e.g in ✖ shaft of femur & some cervical ^{vertebral} dislocation

c) Open reduction :-

- reduced under direct vision & fixed.

* Indications of open reduction :-

- | | |
|--|-------------------------------------|
| 1- failed closed ^{reduction} | 5- neurovascular compromise. |
| 2- Pathological ✖ | 6- intra-articular #. |
| 3- poly trauma | 7- Salter-Harris 3.4.5. |
| 4- non-union | 8- old pt (to avoid long immobiliz) |
| - missed ^{displacement} > 3wk | and pt need to go home early |
| & dislocation | work |

N = Nonunion & failed closed
O = Old pt & pathological ✖
C = neurovascular compromise
A = Intra-Articular ✖

⑤

S = Salter-Harris 3.4.5
T = Poly-Trauma
(NO CAST)

(2) IMMOBILIZATION = (Fixation)

• Aim :- to prevent displacement, movement & to relieve pain.
 - NB :- * may heal without immob. e.g * rib, scapula & clavicle.

• Method :- ① Plaster cast (splint) = POP "plaster of paris"
 ② Continuous traction.
 ③ internal fixation.

① Plaster cast :- may be - below & above elbow & shoulder spica.
 - below & above knee & hip spica.
 - Jacket plaster in ^{spine} back & collar in neck.
 - At first limb plaster is full padded cast then after week (oedema subside) changed to unpadded well moulded plaster cast.
 - Close watching over the next 36 hr (ischemia).

② Continuation traction :- when ms pull around * → displacement after reduction as in * shaft of femur.
 - types are A skin traction $\rightarrow$ in old not good (loss skin elasticity) especially in children
B skeletal traction $\rightarrow$ in children avoided $\rightarrow$ damage ^{epiph} plate by steinmann's pin

③ Internal fixation :- indicated after open reduction.

- methods are ① compression screw (as DHS)

② plate & screw.

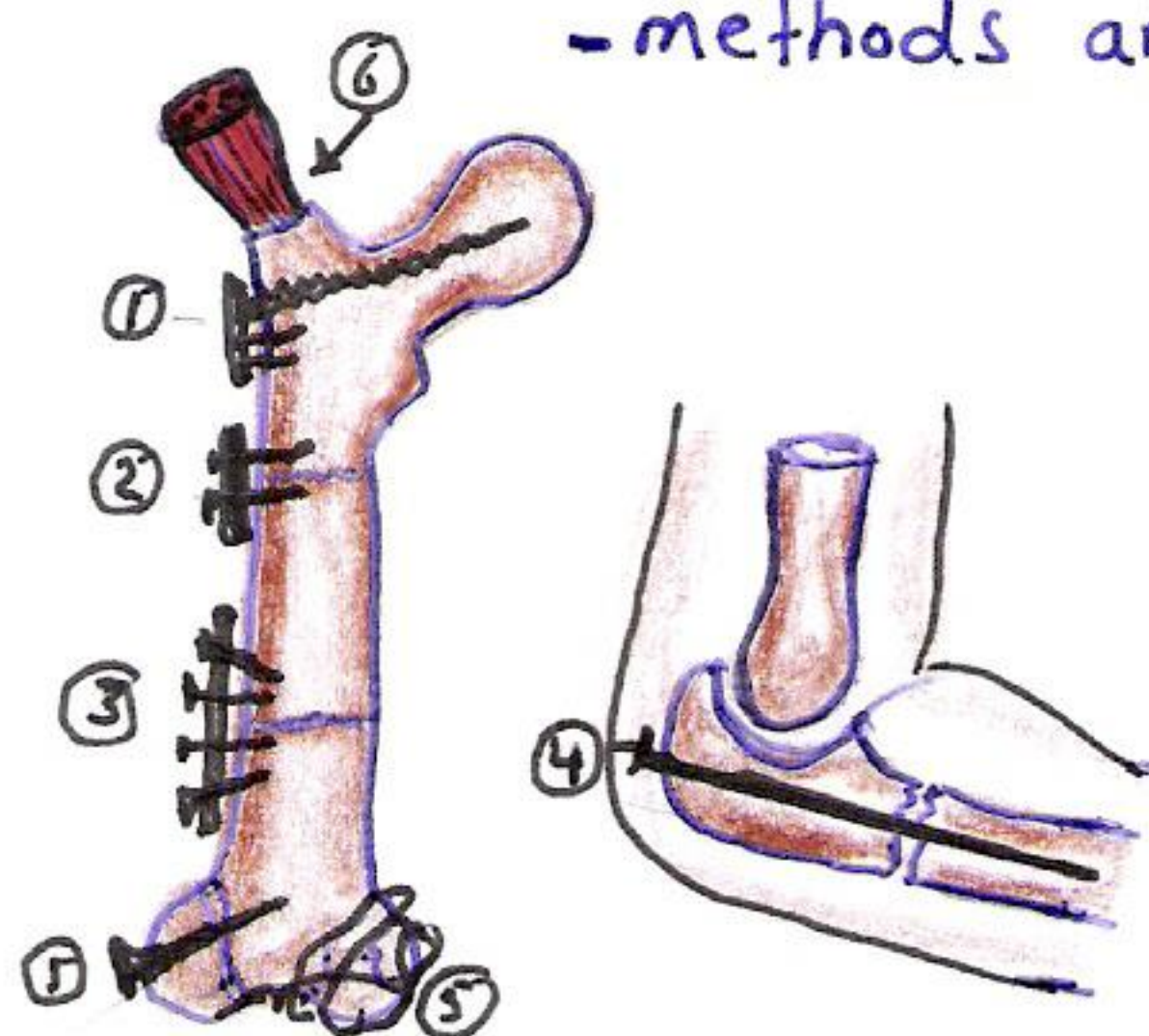
③ compression plate & screw.

④ intramedullary nail $\left\{ \begin{array}{l} \text{closed I.M nail} \\ \text{open I.M nail} \end{array} \right.$

⑤ circumferential wire (K-wires)

⑥ stitching through soft tissue

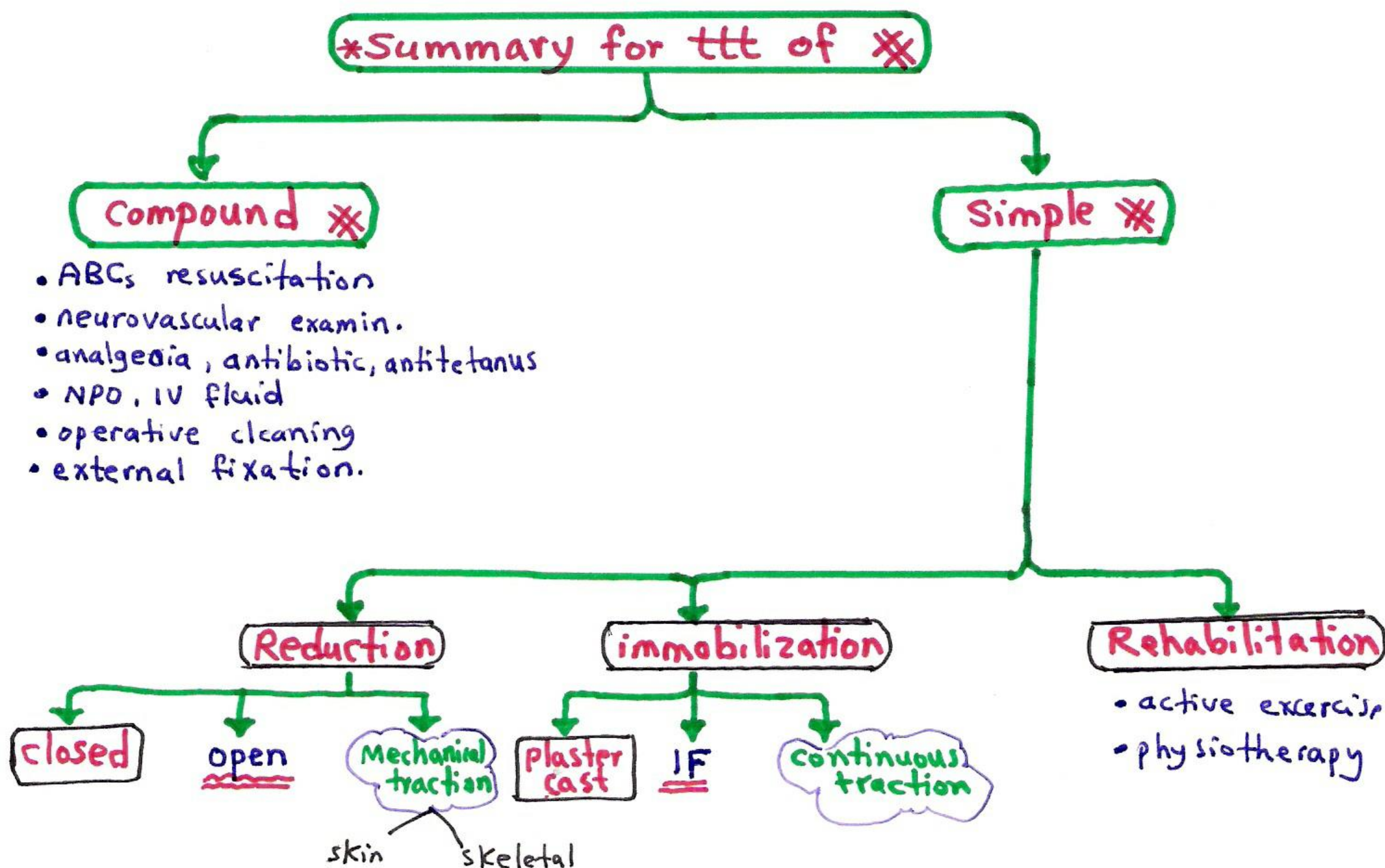
⑦ bone graft held by screw



(3) REHABILITATION

- important principle, aims to preserve ^{& restore} function
 - done by active exercise during casting (static contractions) or by physiotherapy.

[NB] - reduction always immediate except ① central hip dislocation ② dislocation of facet joint of vertebrae, done gradual by traction. ⑥



NB:- skin traction is avoided in old pt due to loss of skin elasticity, so done mainly in children.
 - skeletal traction is avoided in children as it may cause epiphyseal plate damage → shortening.

NB:- Aim of traction (indications) are:-

- ① - To relieve pain, relieve spasm
- ② - pt waiting for surgery
- ③ - In some areas as * shaft of femur, cervical vertebra dislo.

NAIL:

electropolished stainless steel (EPSS) or standard, non-polished titanium-aluminum-niobium (TAN).

Polishing the surface of TAN IM nails has been shown to reduce bony adhesion and ease implant removal without compromising fixation.

Types of external fixator

1-Circular (Elazarooof)

thin pin; -less infection

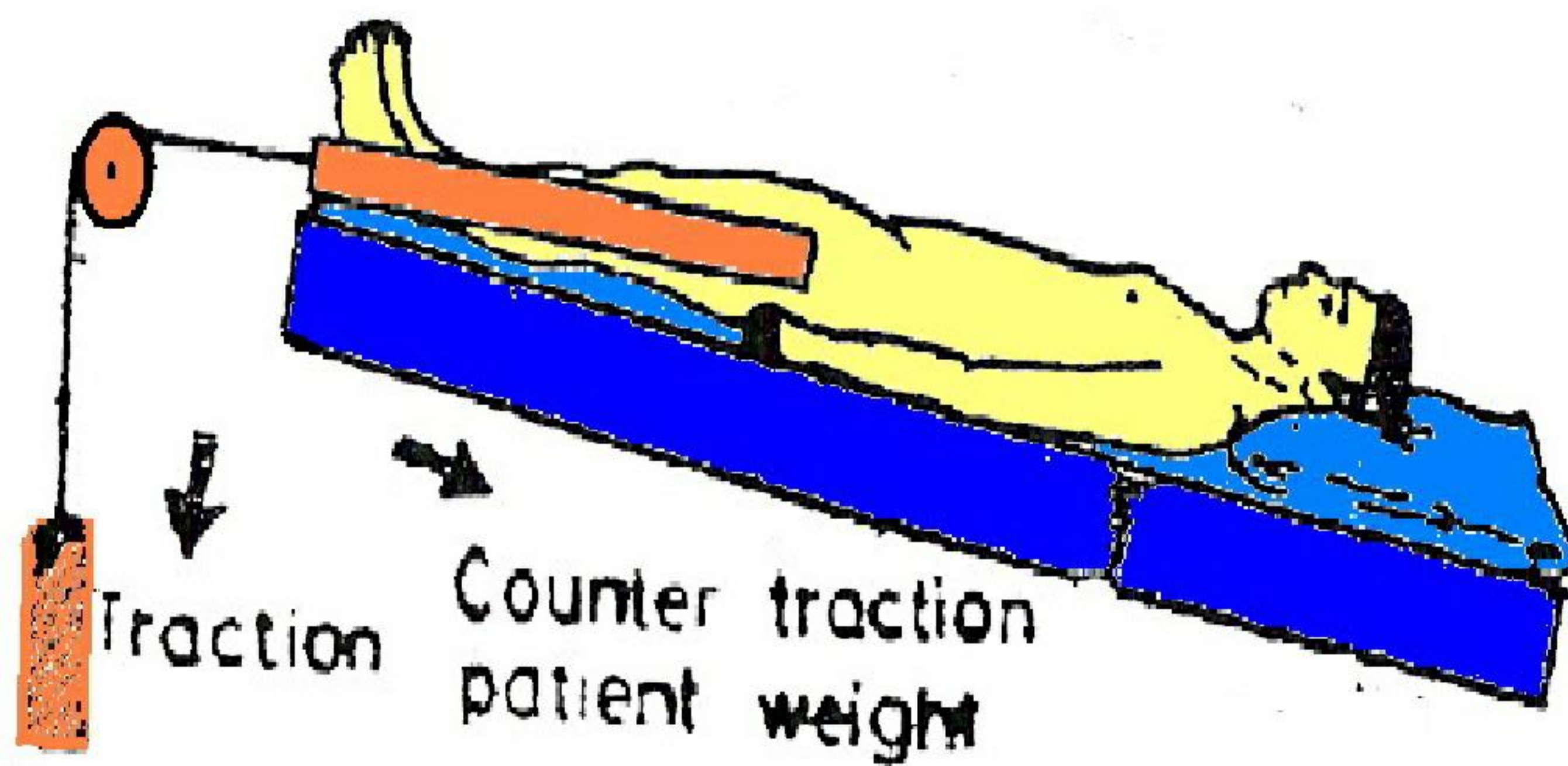
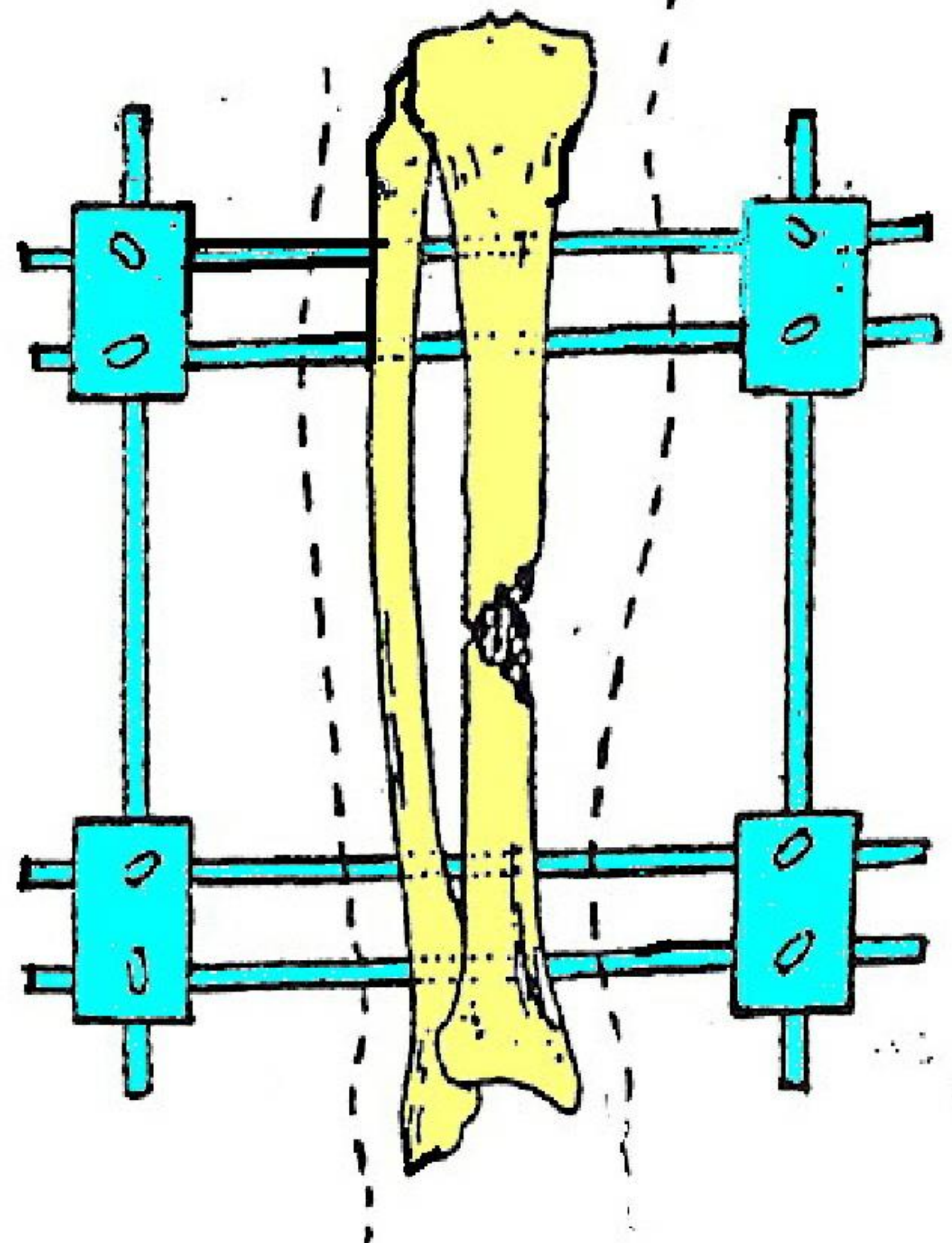
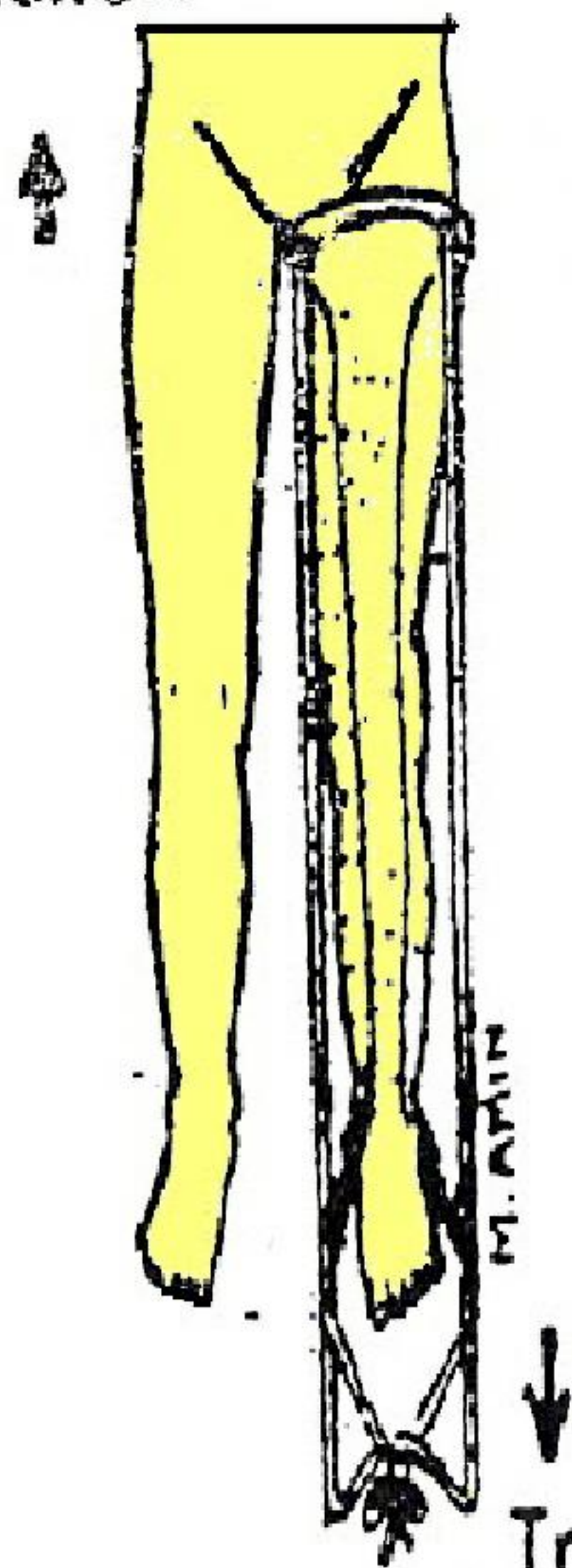
-can withstand pt wt

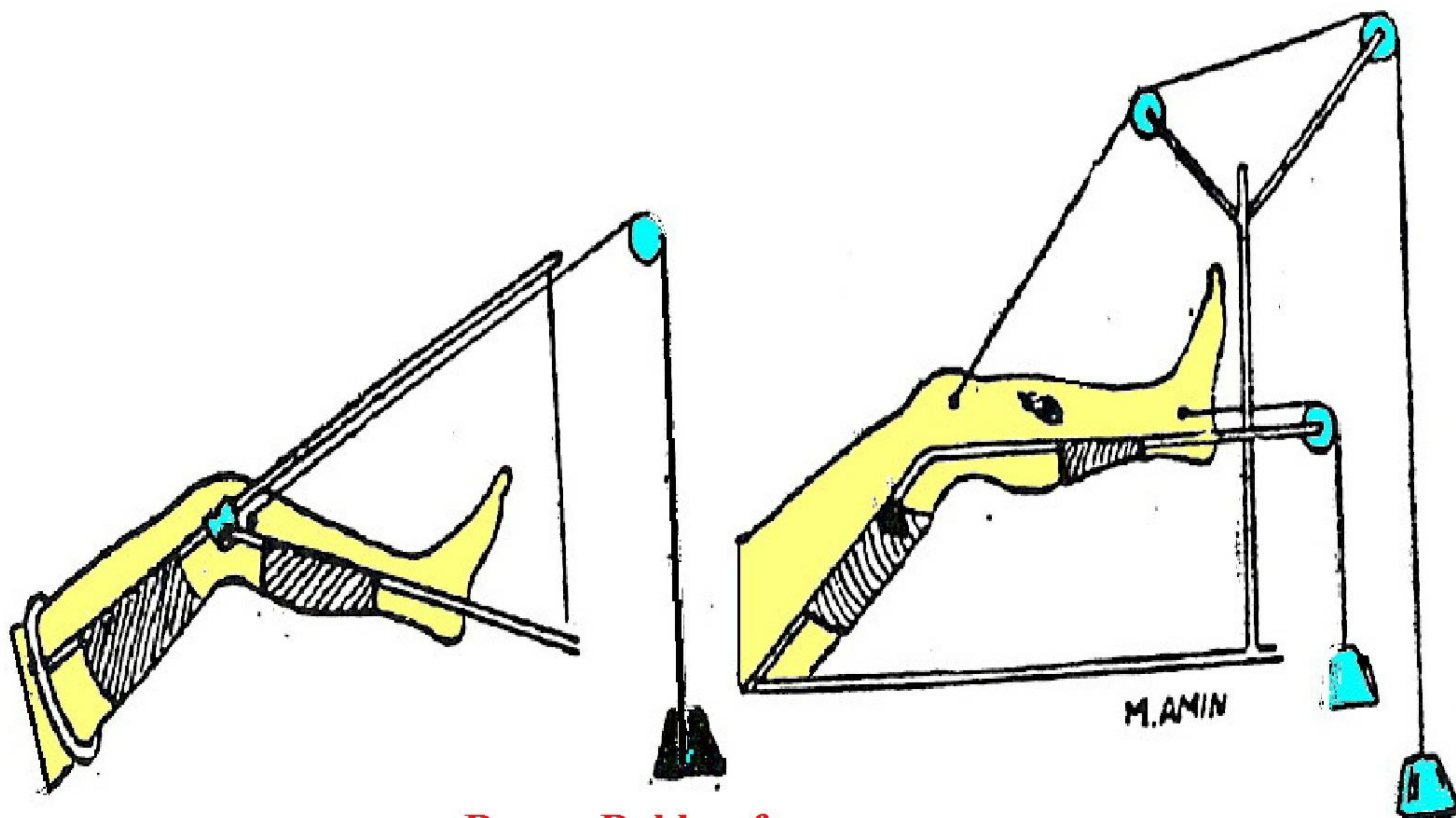
2-Linear

thicker pin; -more infection

-cannot withstand pt wt

Counter traction
against
ischial
tuberosity

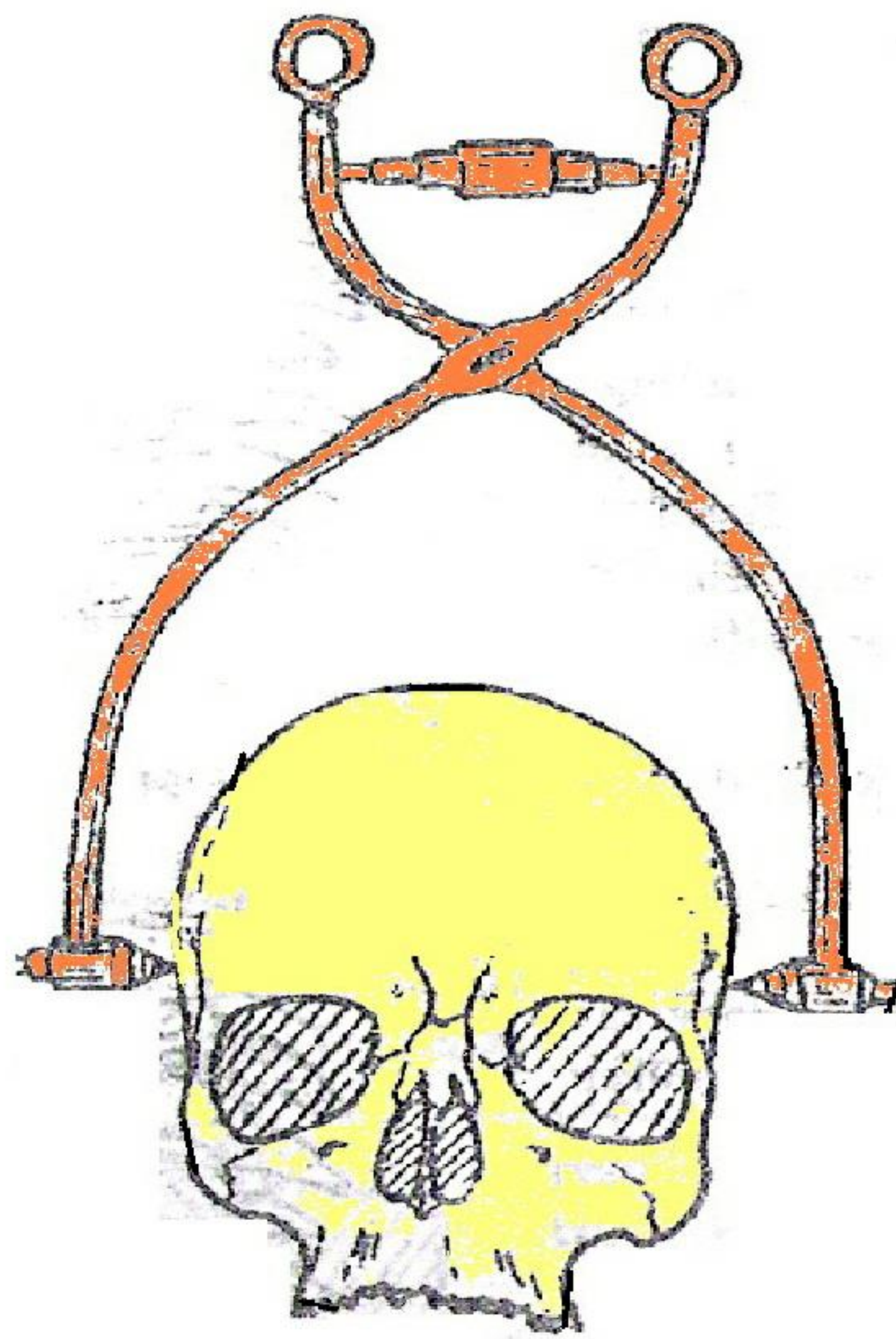




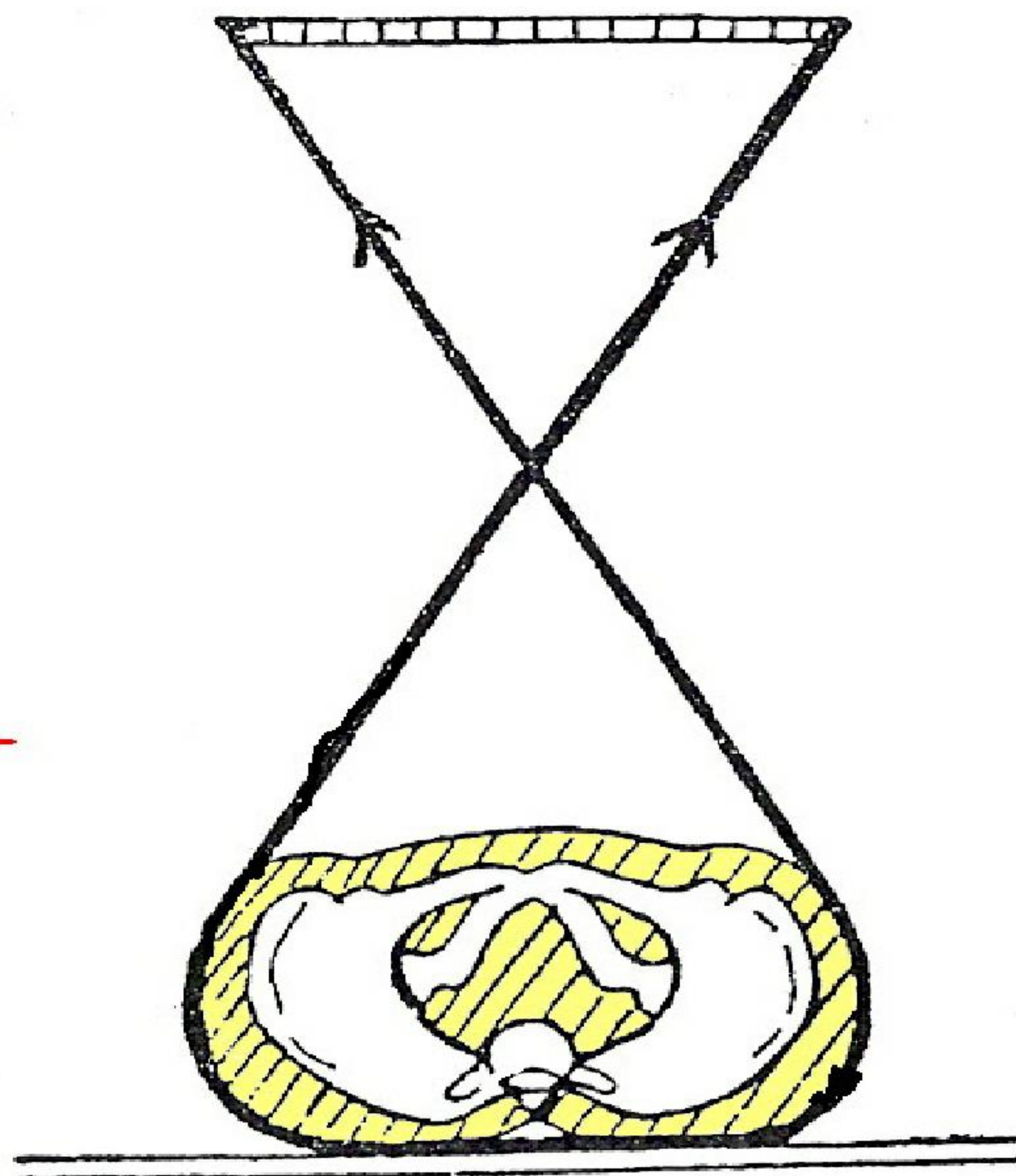
Braun-Bohler frame



Gallow's splint



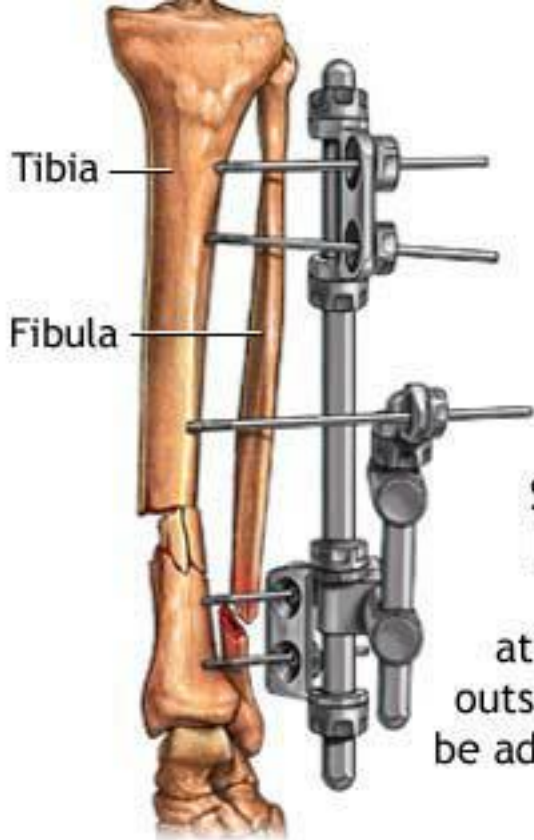
Skull traction



Canvas sling





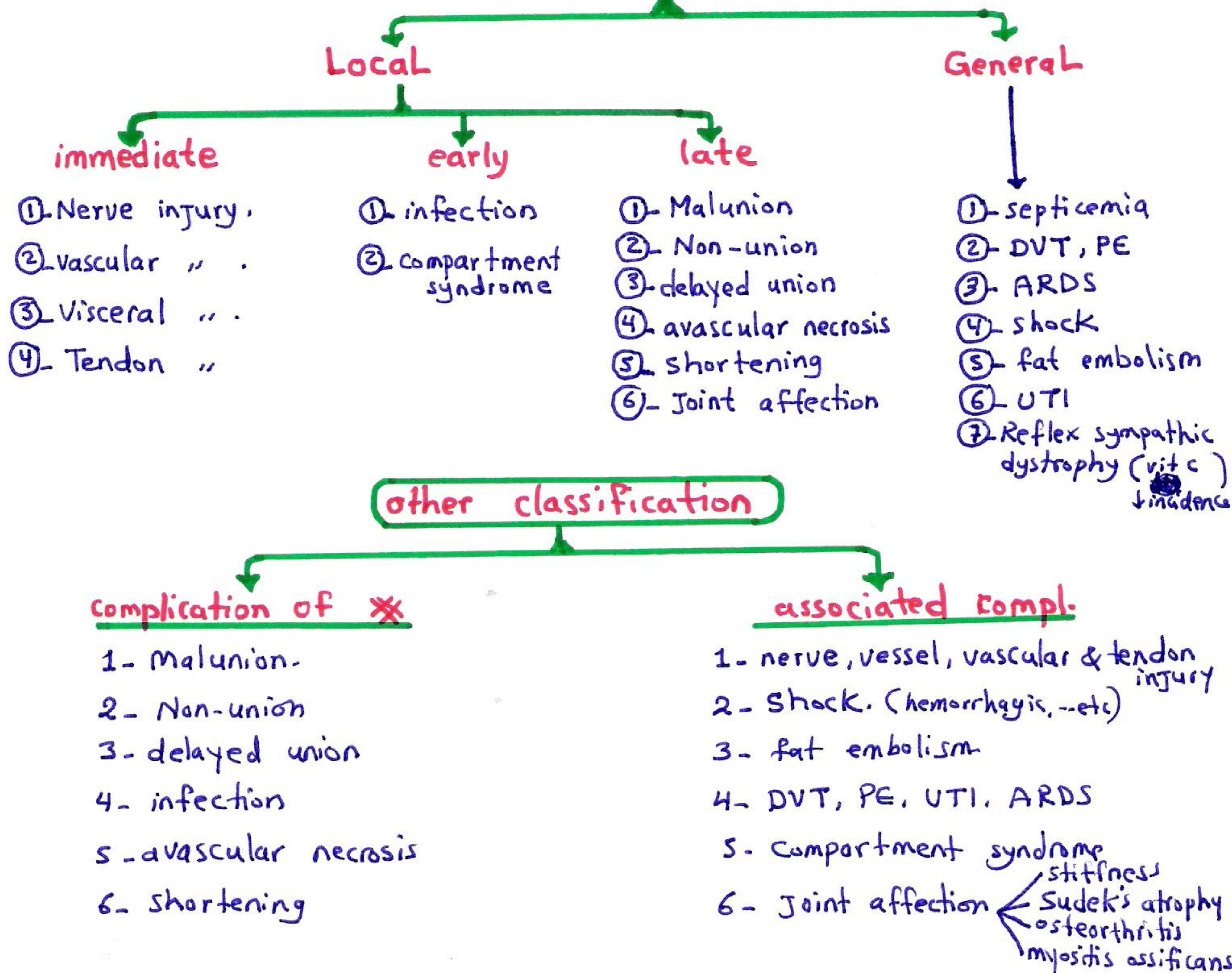


External
fixation



Screws are placed into the bone above and below the fracture, and a device is attached to the screws from outside the skin, where it may be adjusted to realign the bone

*Complications of * :-



*Malunion :- fragments united in imperfect position

- if slight & especially in children → no ttt

- if marked refracture by osteotomy with internal fixation.

*Delayed union :- no healing for > 3 months but < 6m.

- causes (see page 1.) , treat underlying cause.

*Non-union :- no healing for > 6m. , sclerotic ends are formed. ^{x-ray}

- Types are ① atrophic , ② oligotrophic & ③ hypertrophic.

- there is formation of false joint (pseudarthrosis).
especially with hypertrophic type

* Avascular necrosis (AVN) (osteonecrosis) :-

- occurs mostly in scaphoid, femoral head, body of talus also in navicular & lunate (by osteochondritis) b/c supplied only from distal
- on x-ray appear sclerotic "radiodense".
- MRI is more sensitive in the early stages. in Dx.
- Risk factors for AVN are :- steroid, chronic alcohol, septic arthritis, * & dislocation, sickle cell disease, storage disease (Gaucher's dis.), idiopathic (Chandler's dis.).

* Shortening :-

- due to malunion (over-riding), compression *, epiphyseal growth arrest
- important in lower limb if $> 2\text{cm}$, corrected by shoes.
if $> 5\text{cm}$ operative lengthening equalization

* Nerve injury :-

- ≡≡≡ ① Neuropraxia :- physiological "no focal lesion" [resolve spontaneously need wk to month]
 - ≡≡≡ ② Axonotmesis :- (shwan cell damage) = cut of axon only [Long time]
 - ≡≡≡ ③ Neurotmesis :- complete cut of nerve [usually need surgery].
- "NB: regeneration of nerve normally is 1-3 mm/day."

* Vascular injury :-

- the commonest * associated with is supracondylar * of humerus which is common in children.
- injury caused by tear, cut or spasm. or tight cast (splint) ^{"oedema"}
- treated accordingly: - if casted remove cast first.
 - if displaced * do closed reduction (spasm relieved) ^{may}
 - if ~~no~~ improvement open * reduction within 6 hrs, if spasm → papaverine solution, if tear or cut → stitching or graft.
- contusion & spasm result in acute ischaemia & finally → ischaemic contracture of muscle "Volkmann's contracture".

* Visceral injury:-

- e.g - spleen (in ✕ 9th, 10th or 11th left ribs), liver.
- urinary bladder & urethra in ✕ hip bone.

* Tendon injury:-

- e.g extensor pollicis longus tendon in Coll's ✕ (lower ^{end} radius)
- usually treated by figure of 8 stitching "tendon repair"

* Compartment syndrome:-

- Definition:- increase intracompartmental pressure sufficient to cause symptoms & signs.
- compartment (fibro-osseous) is space anatomically done between deep fascia & bone (include ms & tissue, vessel...)

- Aetiology:-
 - 1- tight plaster (cast).
 - acute { 2- fracture & dislocation
 - 3- crush injury, revascularization (as post embolectomy)
 - 4- circumferential burn & cast.
 - 5- chronic causes as aneurysm, tumour, ... etc

- C/P:- picture of ischaemia (6 P)
 - Pain (out of proportion to injury) → most important specially on passive dorsiflexion.

- Investigations:- compartment pressure monitoring (normal = 0 mmHg)
 - urgent ≥ 30 mmHg or within 30 mmHg of diastolic BP
 - Dx is clinical, pressure > 30 diagnostic.

Toronto notes
(12-15 mmHg) المستقيم بين 12-15
(10-15 if > 40 diagnostic)

- Treatment:- remove constrictive casts, splints.
 - elevate limb.
 - definitive ttt → fasciotomy to release compartments
- Complications:- Rhabdomyolysis, renal failure (myoglobinuria)
 - Volkmann's contracture, cardiac **arrest**
 - gangrene.

* Joint affection:-

● Joint stiffness :-

- occurs due to intraarticular ✕ & prolonged immobilization.
- treated by active exercise, physiotherapy ± manipulation under G.A.

● Myositis ossificans (Post-traumatic ossification) :-

- occurs due to stripping of capsule & periosteum from bones, lead to collection of blood under them → hematoma around the joint → hematoma invaded by osteoblast and becomes ossified.
- Commonest around elbow in children "supracondylar ✕"
- Treated by NSAID, rest, exercises [manipulation is completely contraindicated → more bleeding]. excision (6-24 months)
D/D osteosarcoma

● Sudek's post-traumatic osteoporosis :-

- Pain & marked joint stiffness in the hand or foot of the injured limb.
- the cause is unknown, symptoms appears after plaster removal.
- O/E :- skin is red & glossy, nail & hairs atrophied.
- Dx :- X-ray → spotty osteoporosis (usually severe).
- ttt :- active exercises + Local heat, physiotherapy.
- recovery occurs in 2-4 months
- some cases may need sympathectomy.
psychological therapy
- steroid.

{sudek's atrophy = algodystrophy} = sympathetic reflex syndrome

* Fat embolism :-

- uncommon but very serious, occurs $\bar{e}$ ✕ femur mainly. usually after 2 days of ✕.
- fat globules → lung & brain via blood vessels.
- treated by 100% O₂ with positive pressure respiration.

electropolished stainless steel (EPSS) or standard, non-polished titanium-aluminum-niobium (TAN).

Polishing the surface of TAN IM nails has been shown to reduce bony adhesion and ease implant removal without compromising fixation.

Complication of traction

- 1- pressure ulcer
- 2- pneumonia, UTI
- 3- foot drop
- 4- pin tract infection
- 5- thromboembolism

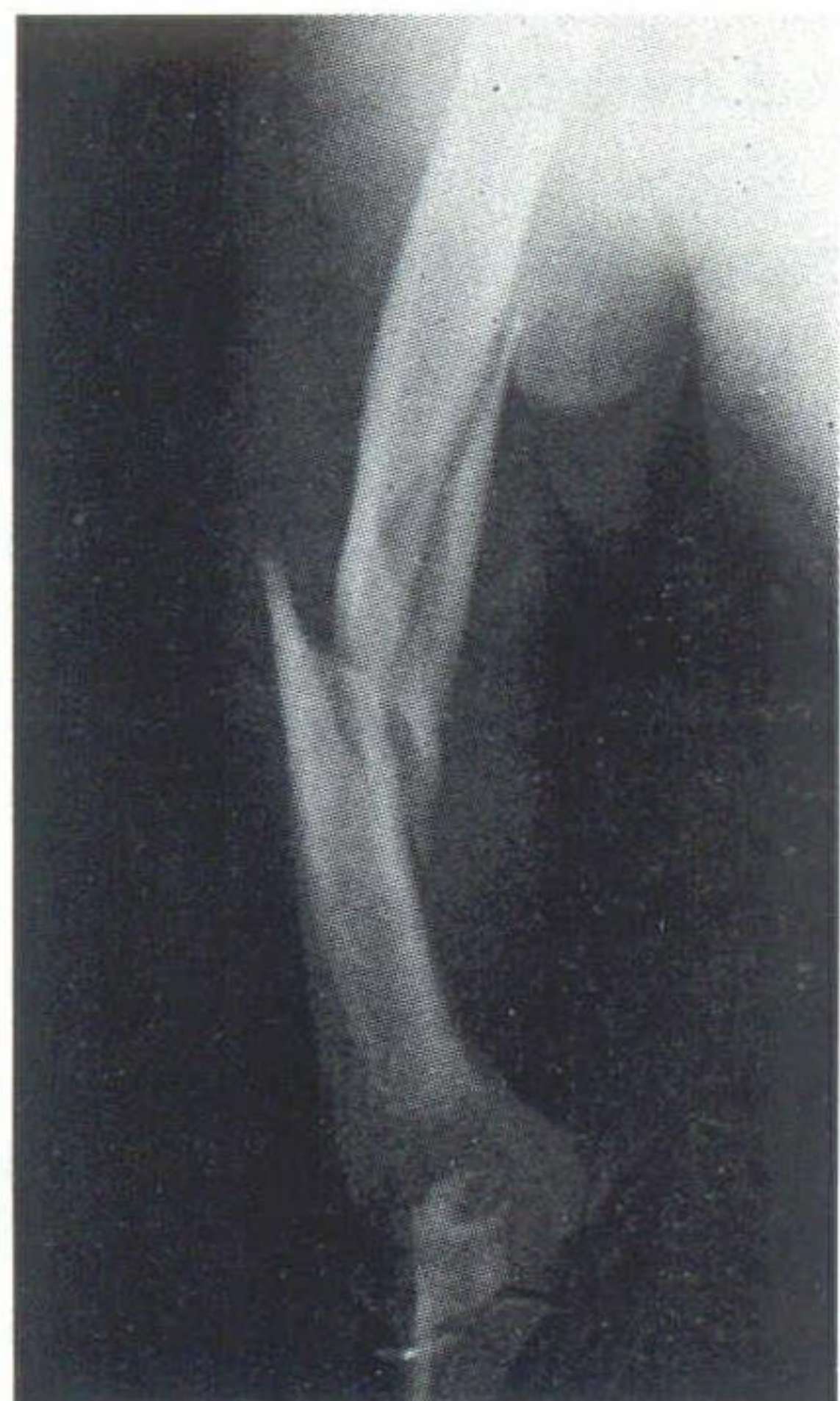
External fixation compl.

- 1- pain tract infection
- 2- pain loosening & break
- 3- joint stiffness
- 4- Neurovascular damage
- 5- misalignment
- 6- epiphyseal plate damage

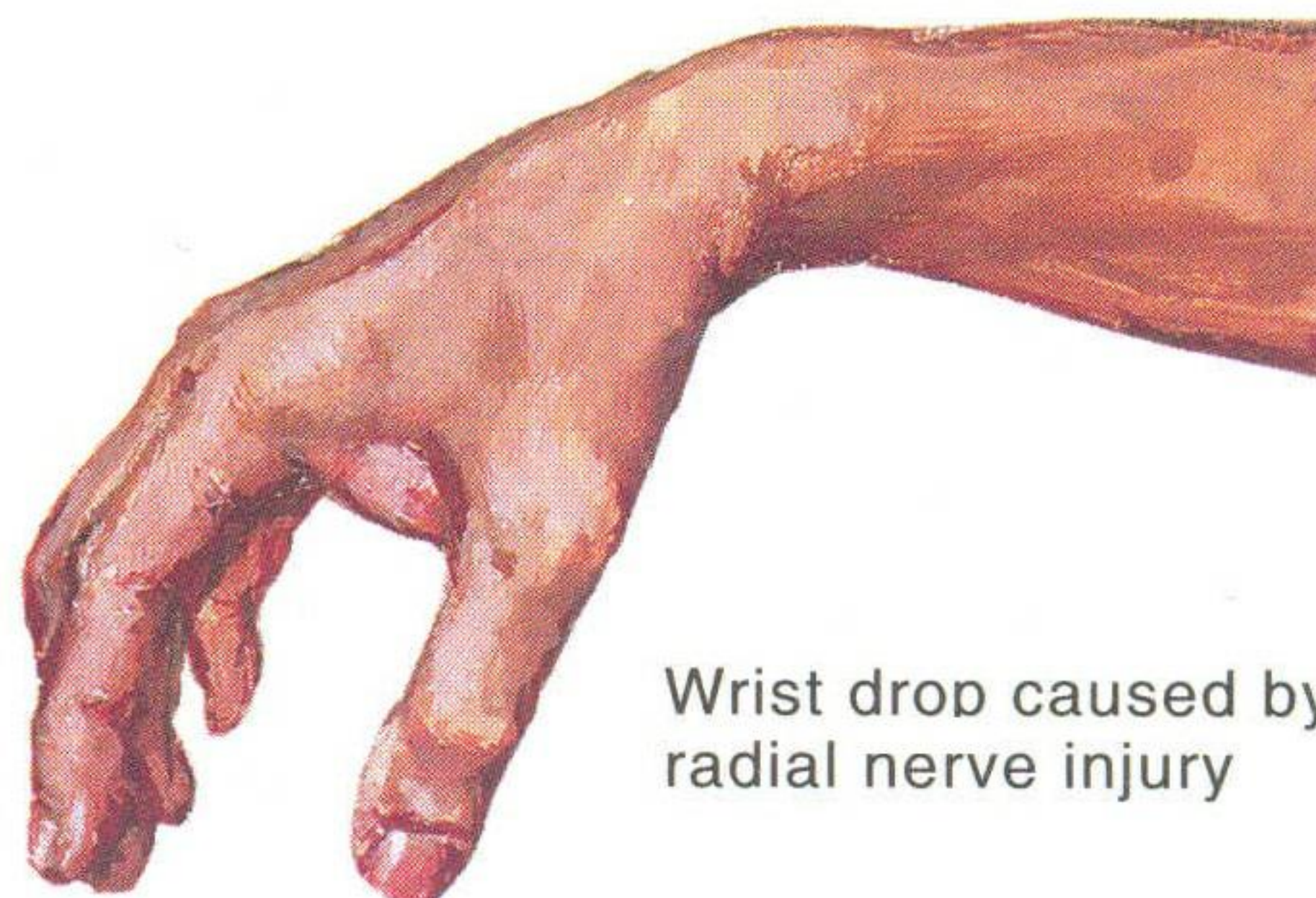




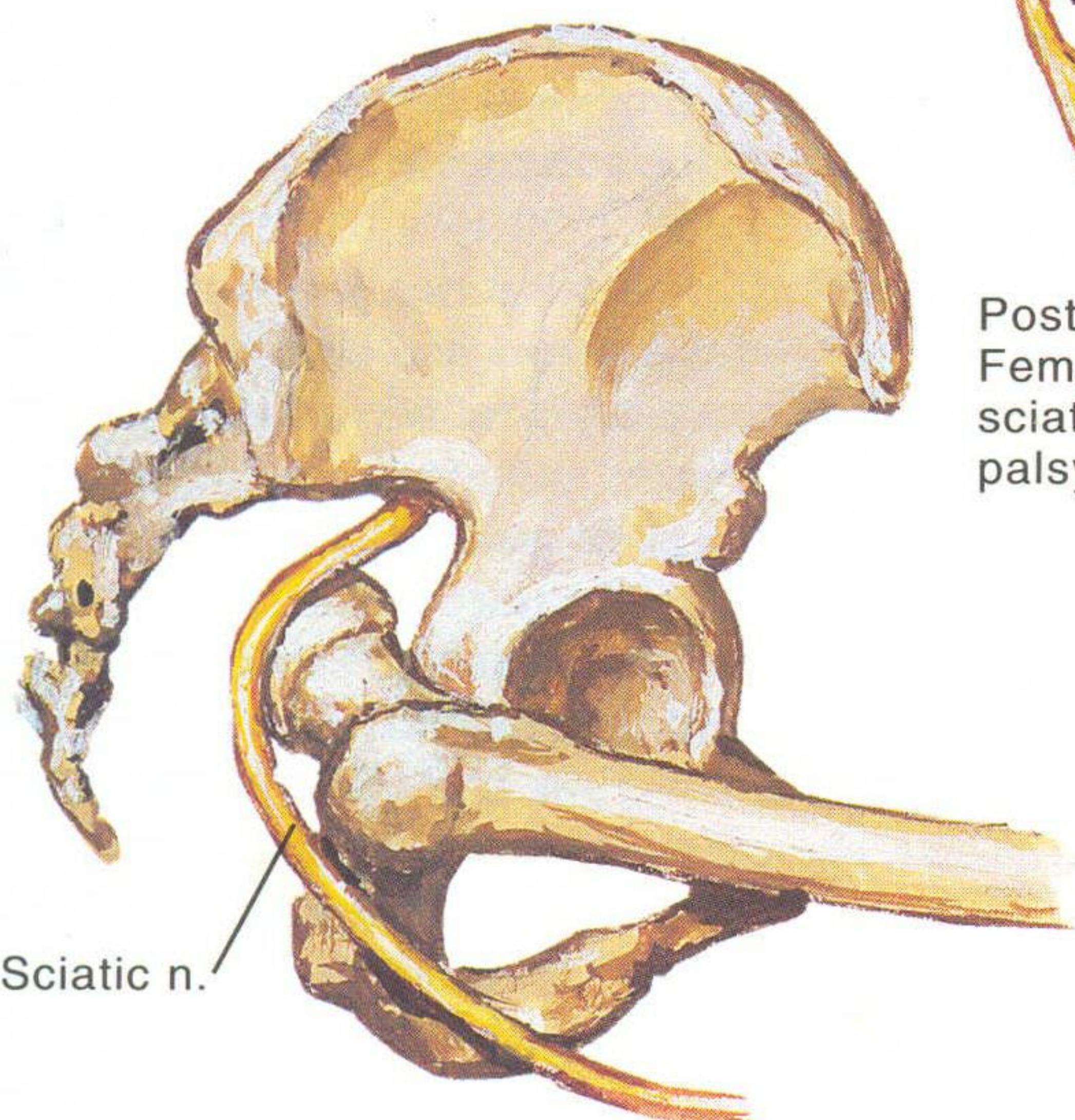
Neurovascular Injuries



Fracture of humeral shaft with entrapment of radial nerve in spiral groove



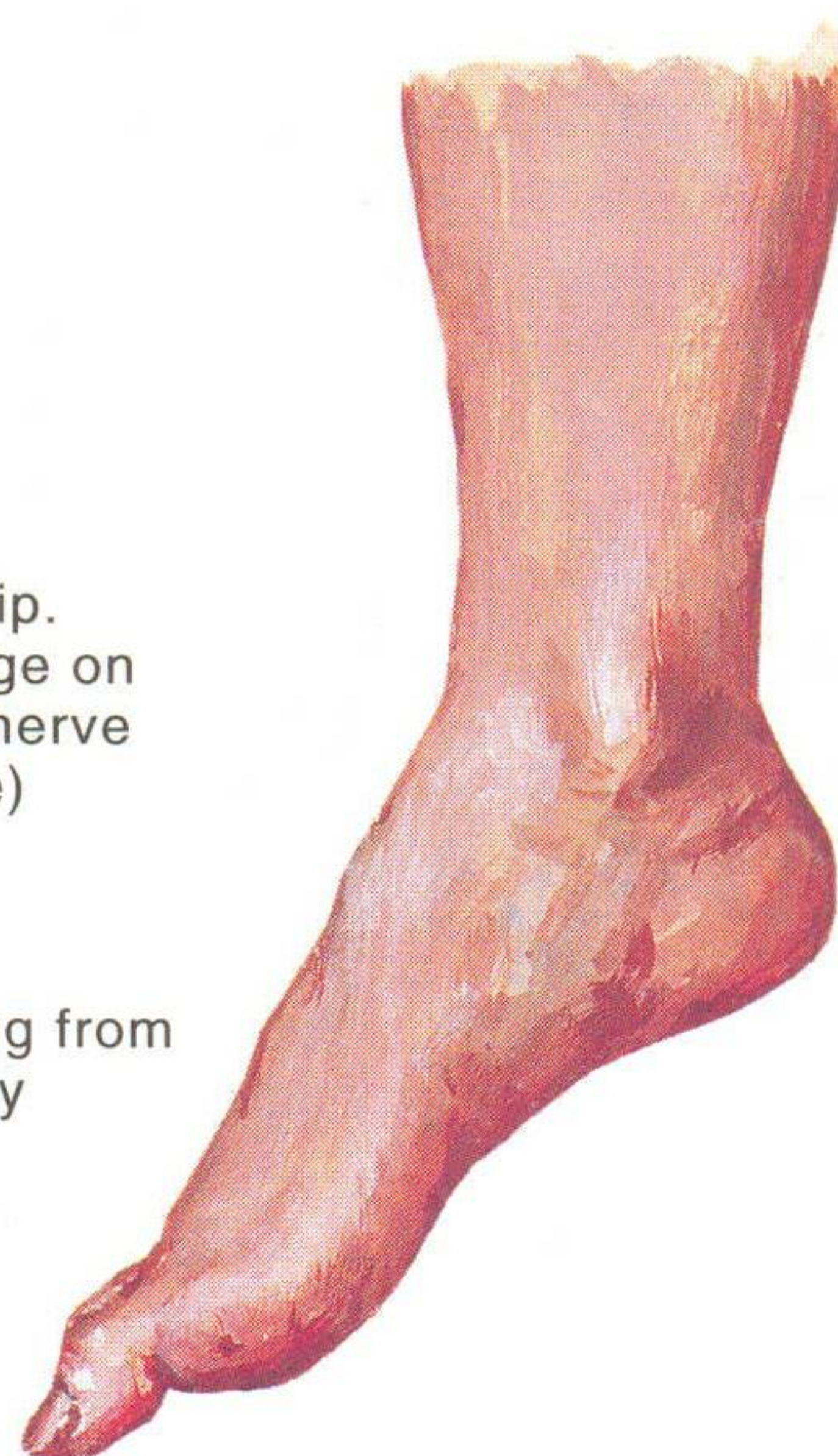
Wrist drop caused by radial nerve injury



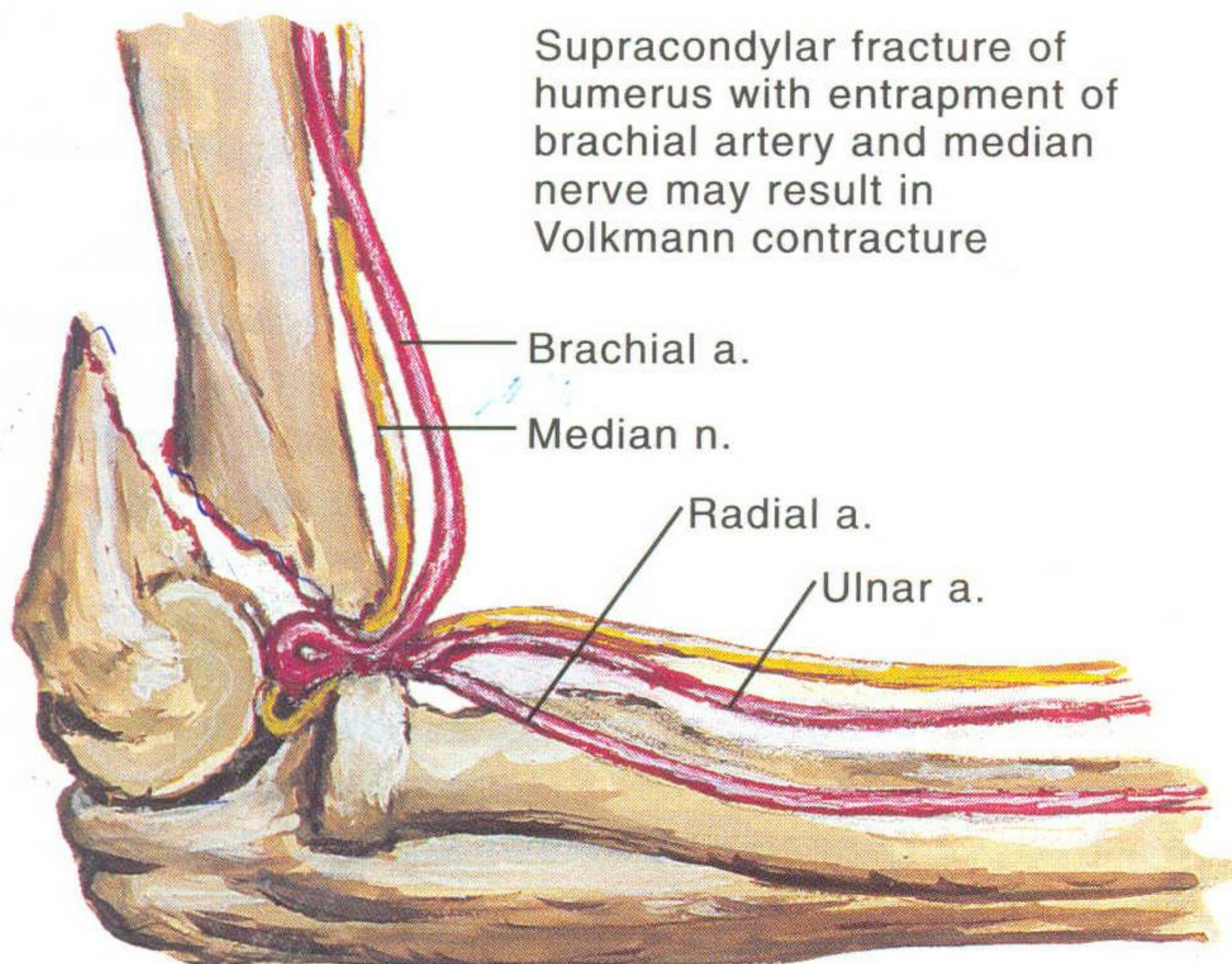
Posterior dislocation of hip. Femoral head may impinge on sciatic nerve, leading to nerve palsy (partial or complete)

Sciatic n.

Foot drop resulting from sciatic nerve palsy



Supracondylar fracture of humerus with entrapment of brachial artery and median nerve may result in Volkmann contracture

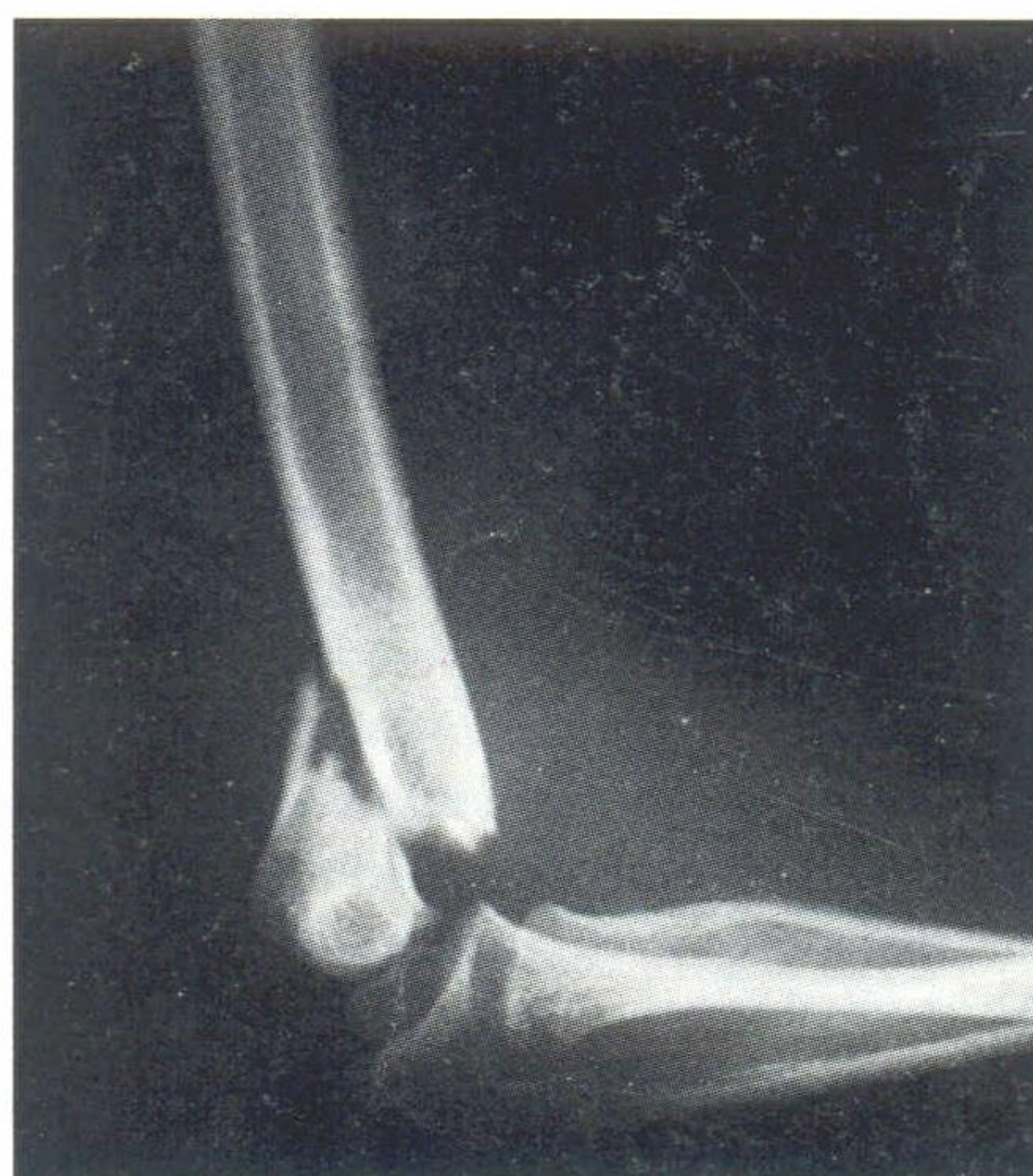


Brachial a.

Median n.

Radial a.

Ulnar a.



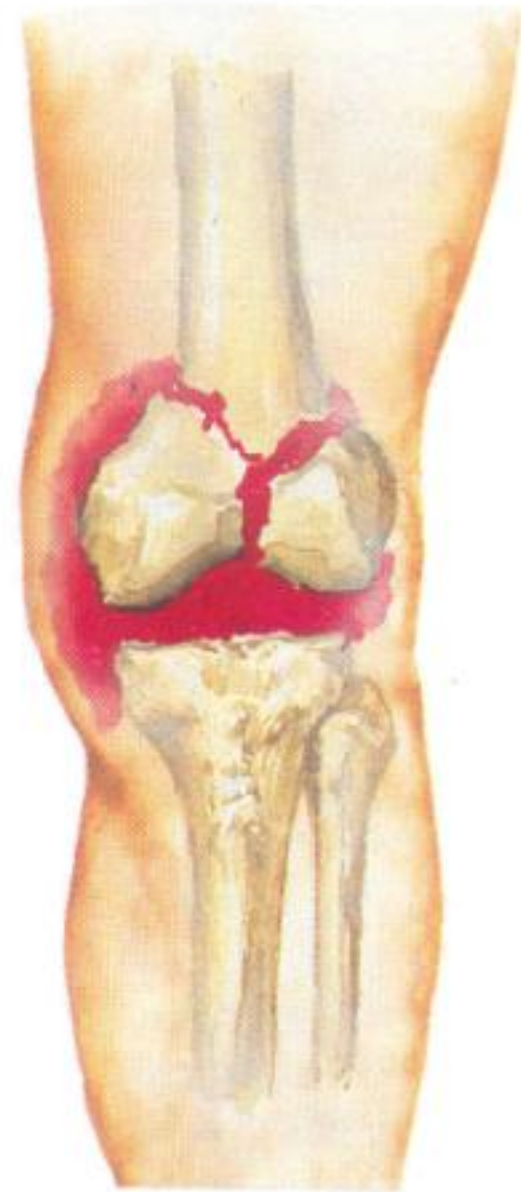
Open and Closed Fractures



Closed fracture with
large hematoma



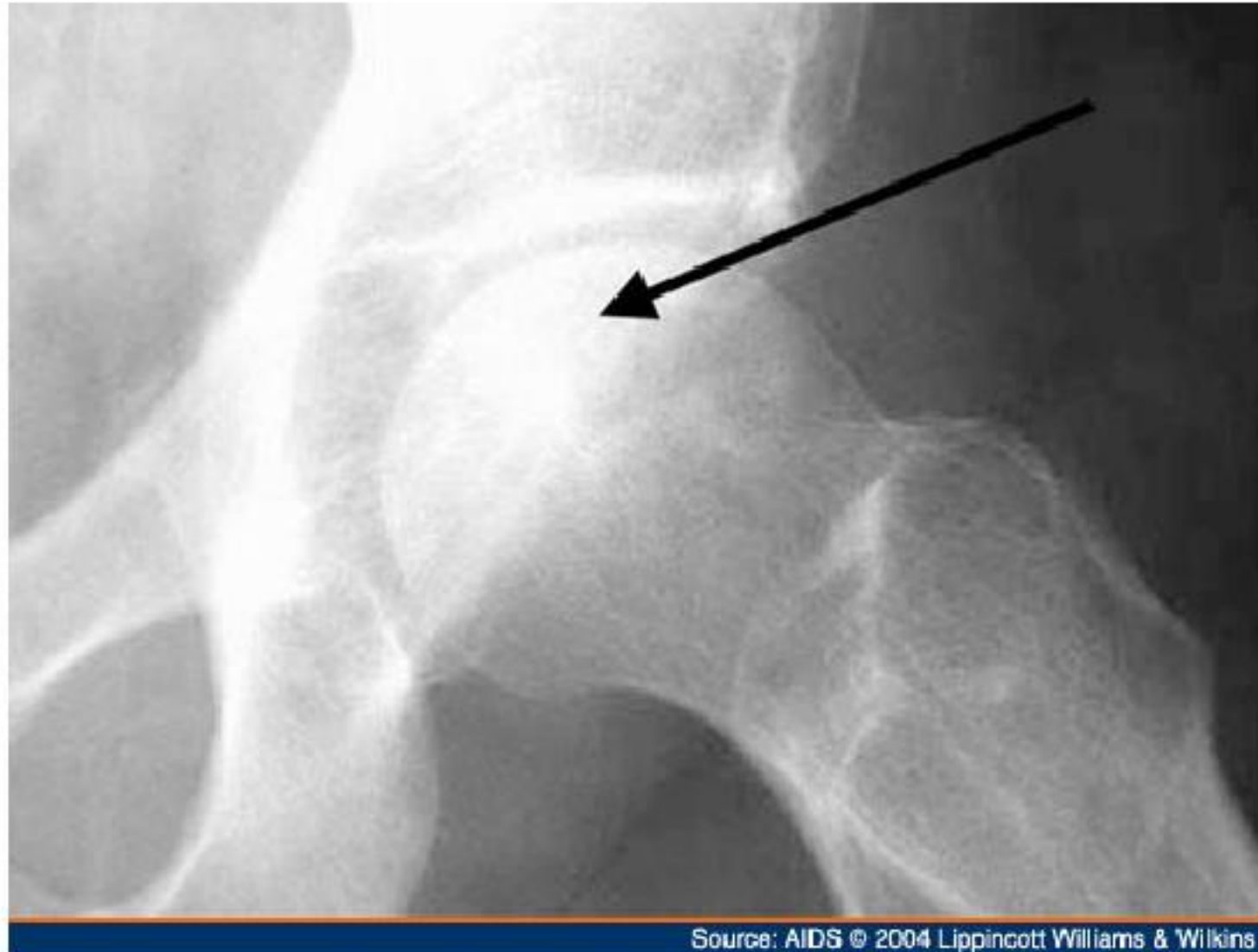
Open fracture with
external bleeding



Intraarticular fracture
with hemarthrosis

skeletal traction





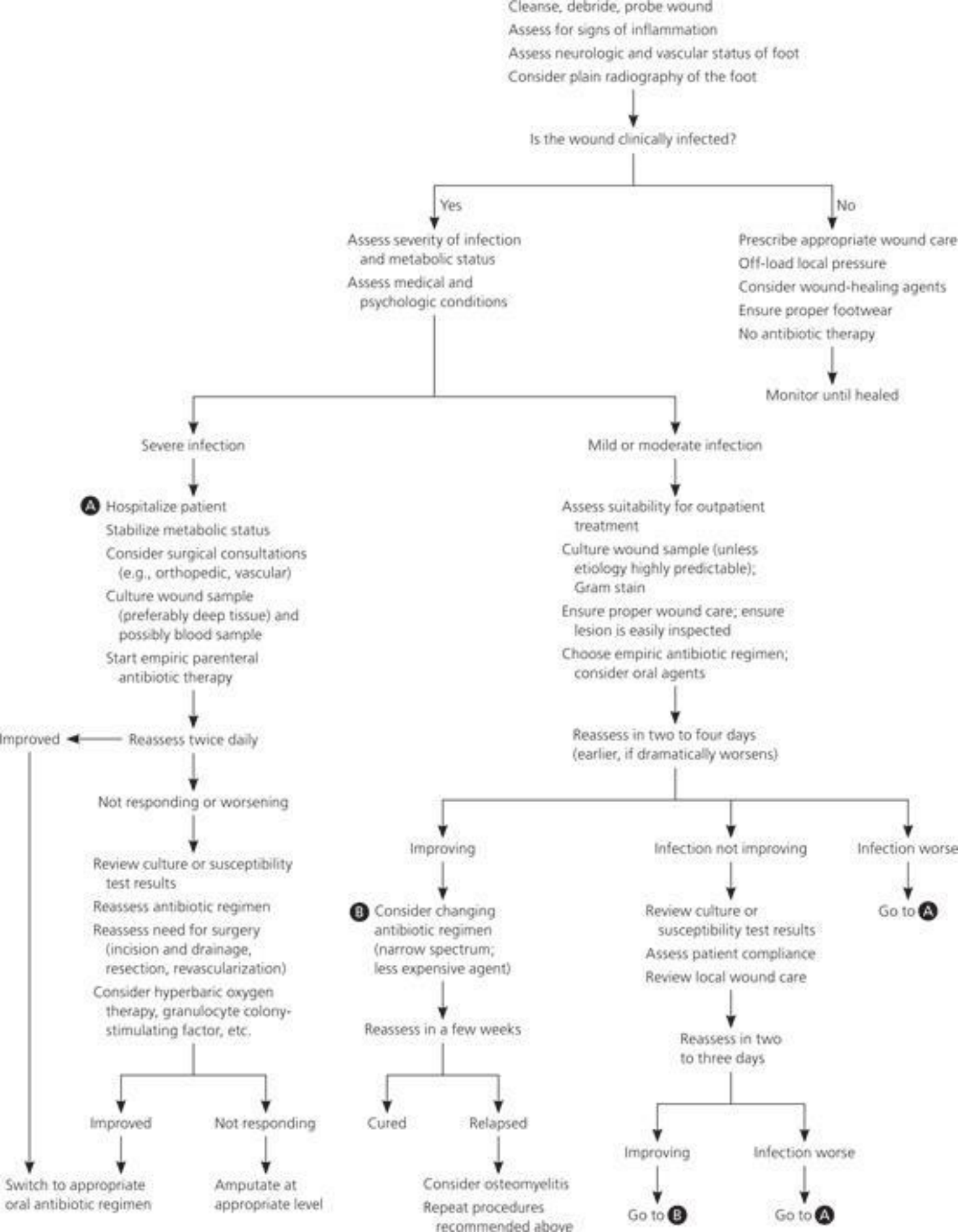
Source: AIDS © 2004 Lippincott Williams & Wilkins

Radiograph of avascular necrosis of the femoral head with **classic crescent shape**.

Hand Sudecks Arthropathy Radial Nerve Injury







Early complications

Local

- Vascular injury causing haemorrhage, internal or external
- Visceral injury causing damage to structures such as the brain, lung or bladder
- Damage to surrounding tissue, nerves or skin
- Haemarthrosis
- **Compartment syndrome** (or Volkmann's ischaemia)
- Wound Infection - more common for open fractures

Systemic

- **Fat embolism**
- Shock
- **Thromboembolism** (pulmonary or venous)
- Exacerbation of underlying diseases such as diabetes or coronary artery disease (CAD)
- Pneumonia

Late complications of fractures

Local

- Delayed union
- Nonunion
- Malunion
- Joint stiffness
- Contractures
- Myositis ossificans
- Avascular necrosis
- Algodystrophy (or Sudeck's atrophy)
- Osteomyelitis
- Growth disturbance or deformity

Systemic

- Gangrene, tetanus, septicaemia
- Fear of mobilising
- Osteoarthritis

Upper Brachial Plexus Injuries

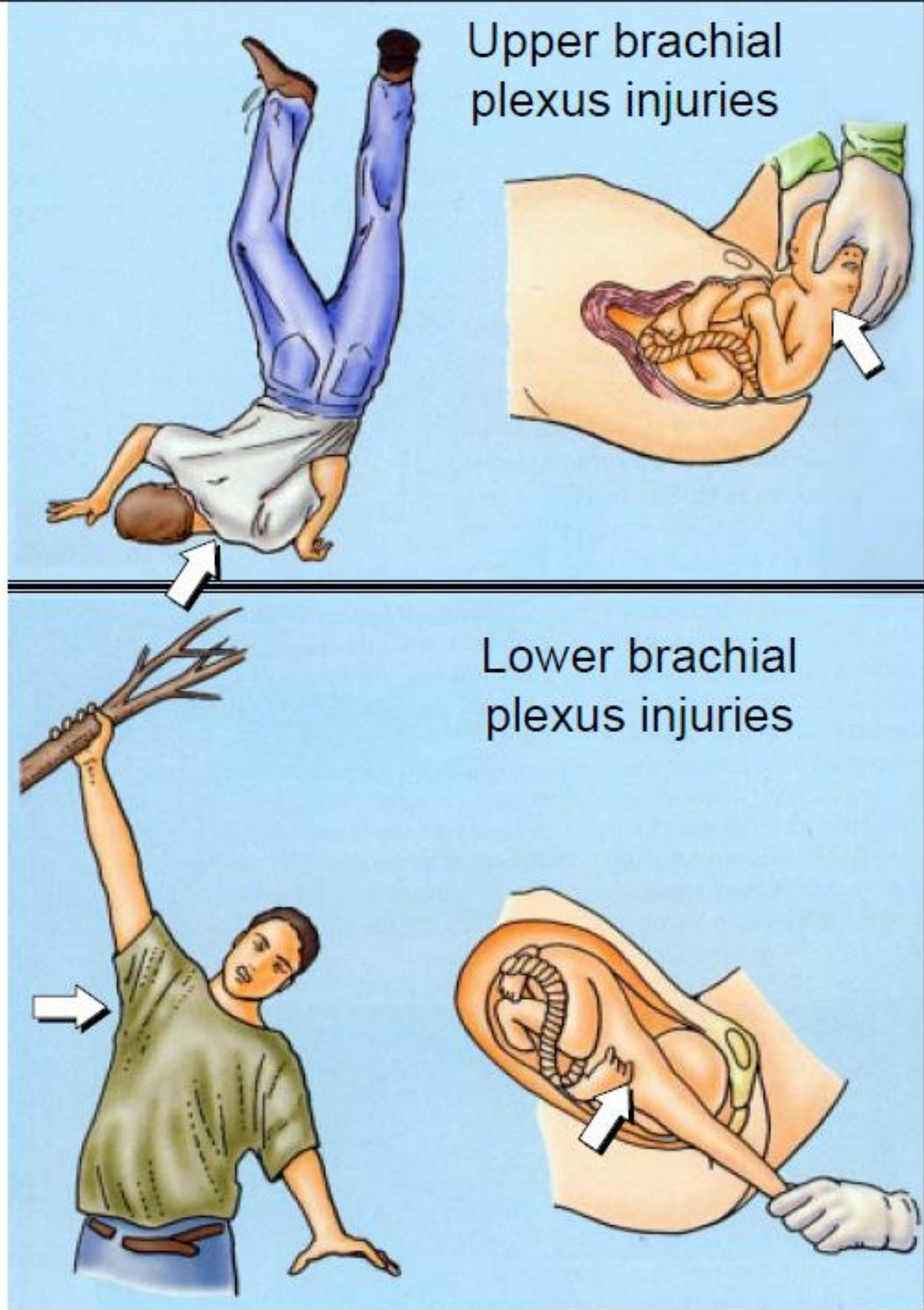
- Increase in angle between neck & shoulder
- Traction (stretching or avulsion) of upper ventral rami (e.g., C5, C6)
- Produces Erb's Palsy

Lower Brachial Plexus Injuries

- Excessive upward pull of limb
- Traction (stretching or avulsion) of lower ventral rami (e.g., C8, T1)
- Produces Klumpke's Palsy

"Obstetrical" or "Birth palsy"

- Becoming increasingly rare
- Categorized on basis of damage
 - Type I: Upper (C5,6), Erb's
 - Type II: All (C5-T1), both palsies
 - Type III: Lower (C8, T1), Klumpke's Palsy

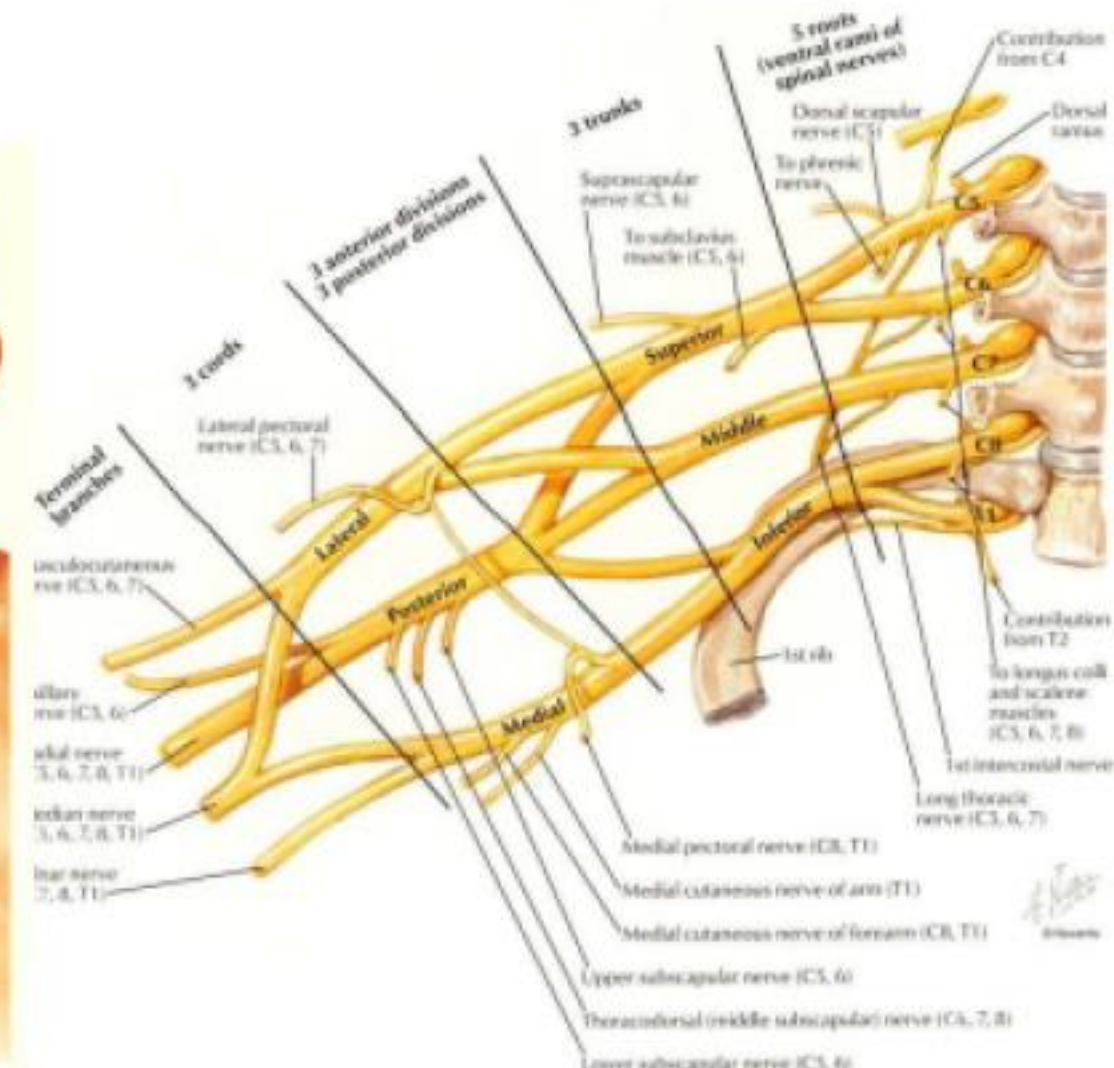
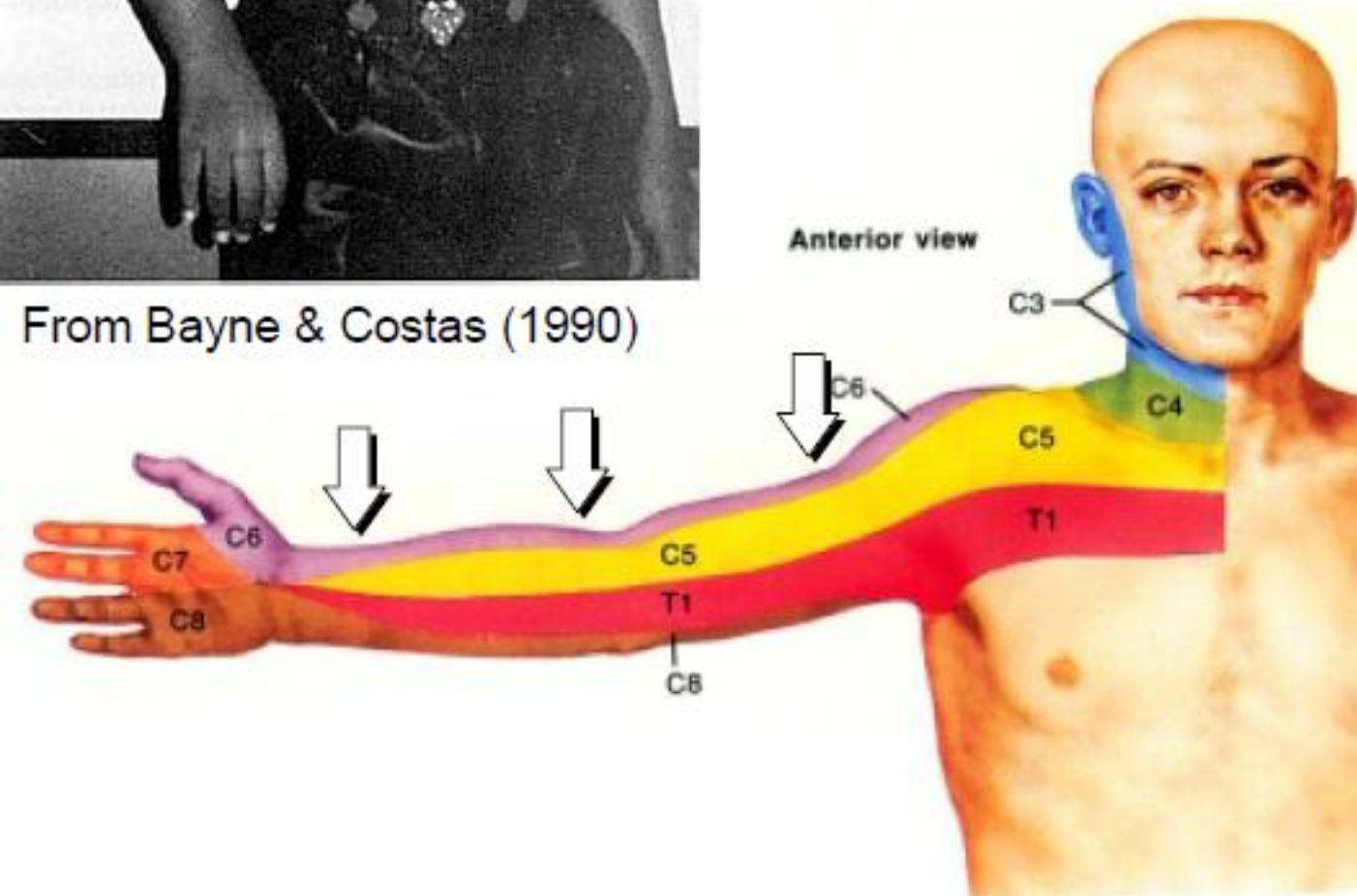


Upper Brachial Plexus Injury: Erb's Palsy

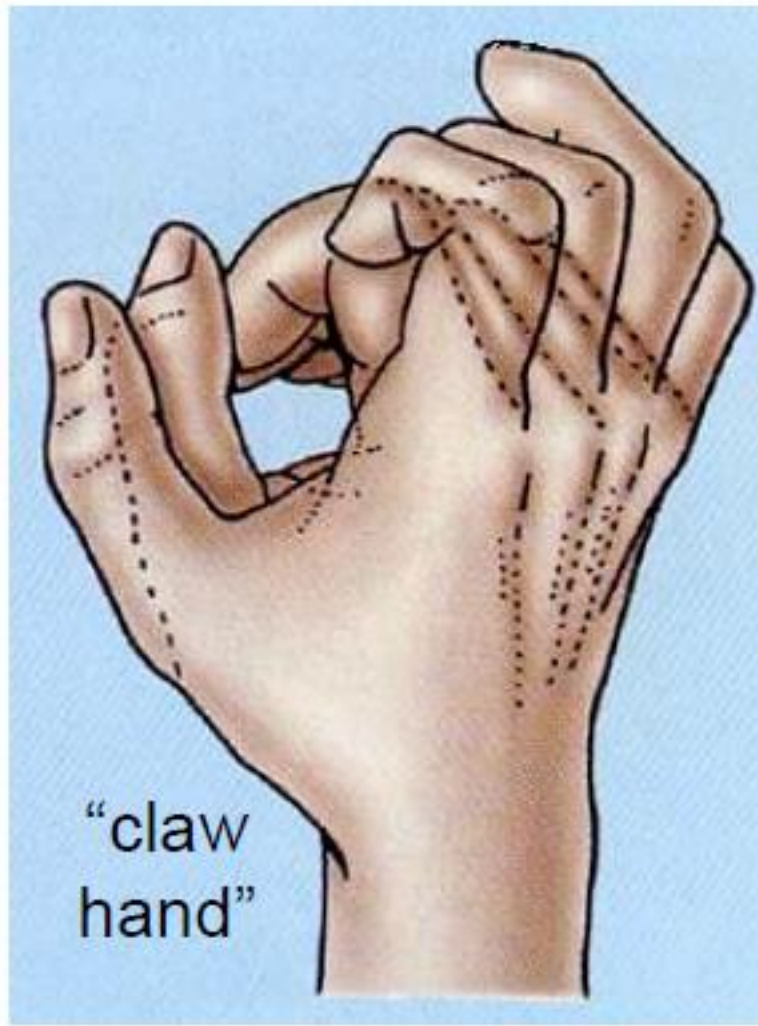


- Appearance: drooping, wasted shoulder; pronated and extended limb hangs limply (“waiter’s tip palsy”)
- Loss of innervation to abductors, flexors, & medial rotators of shoulder and flexors & supinators of elbow
- Loss of sensation to lateral aspect of upper extremity

From Bayne & Costas (1990)



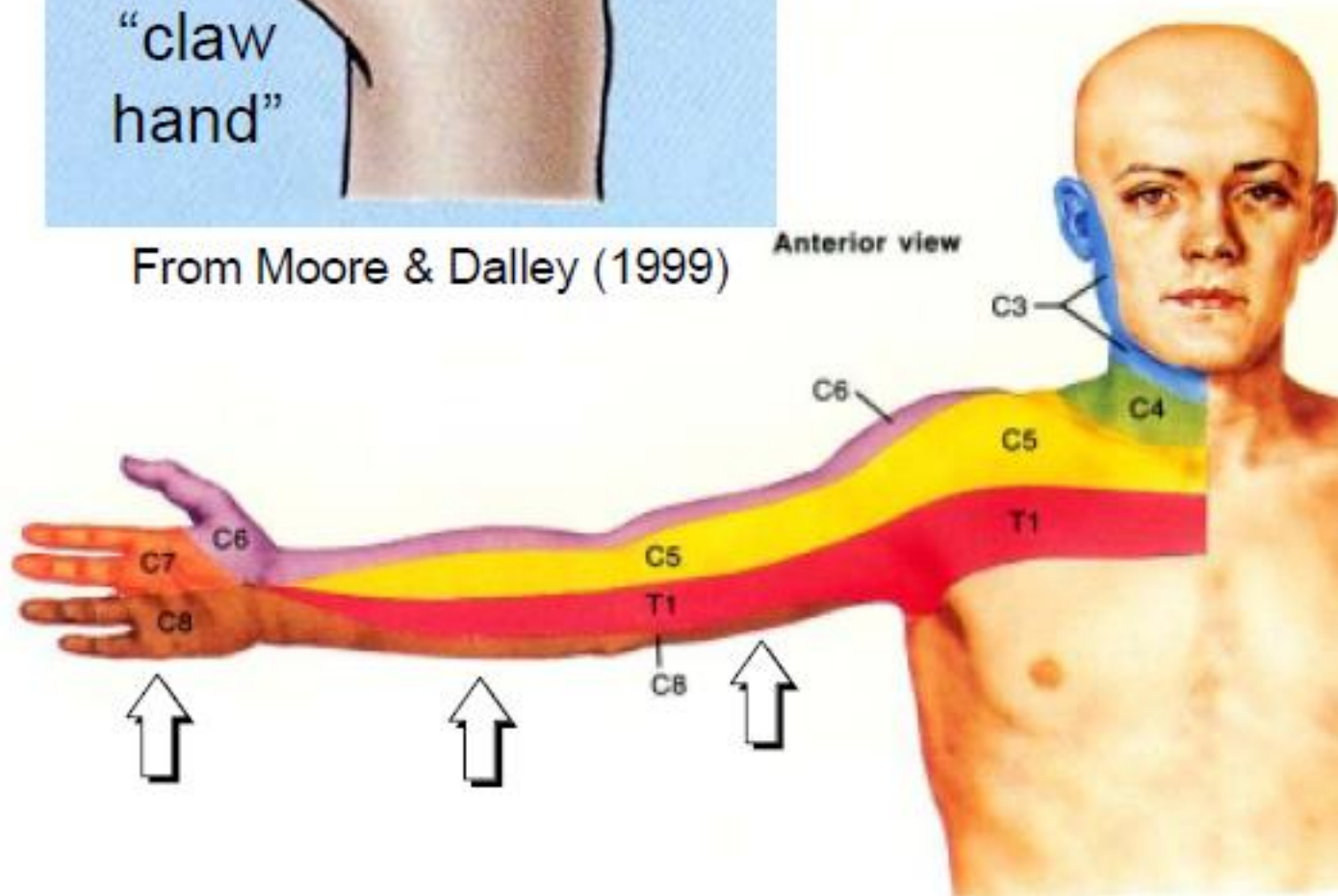
Lower Brachial Plexus Injury: Klumpke's Palsy



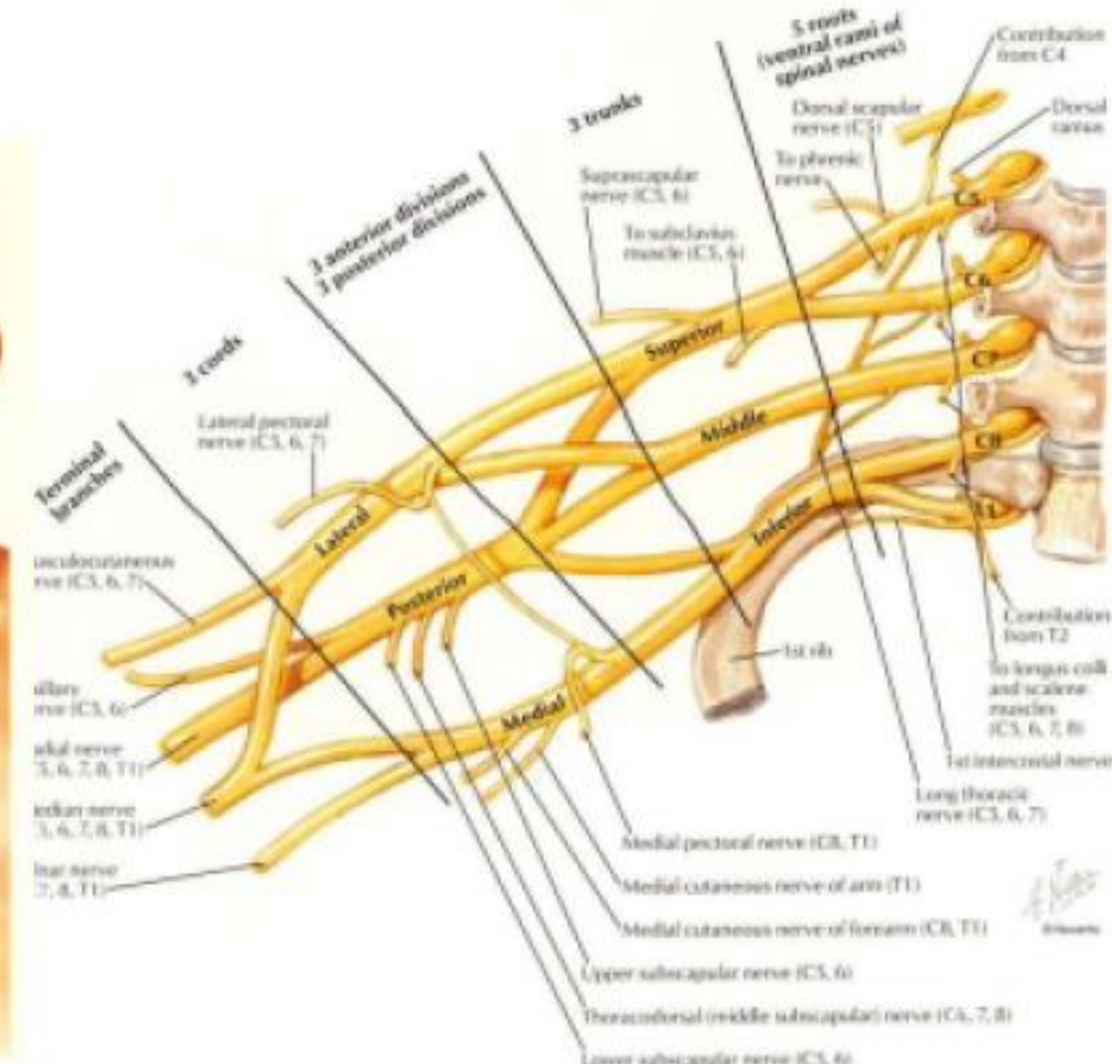
"claw hand"

From Moore & Dalley (1999)

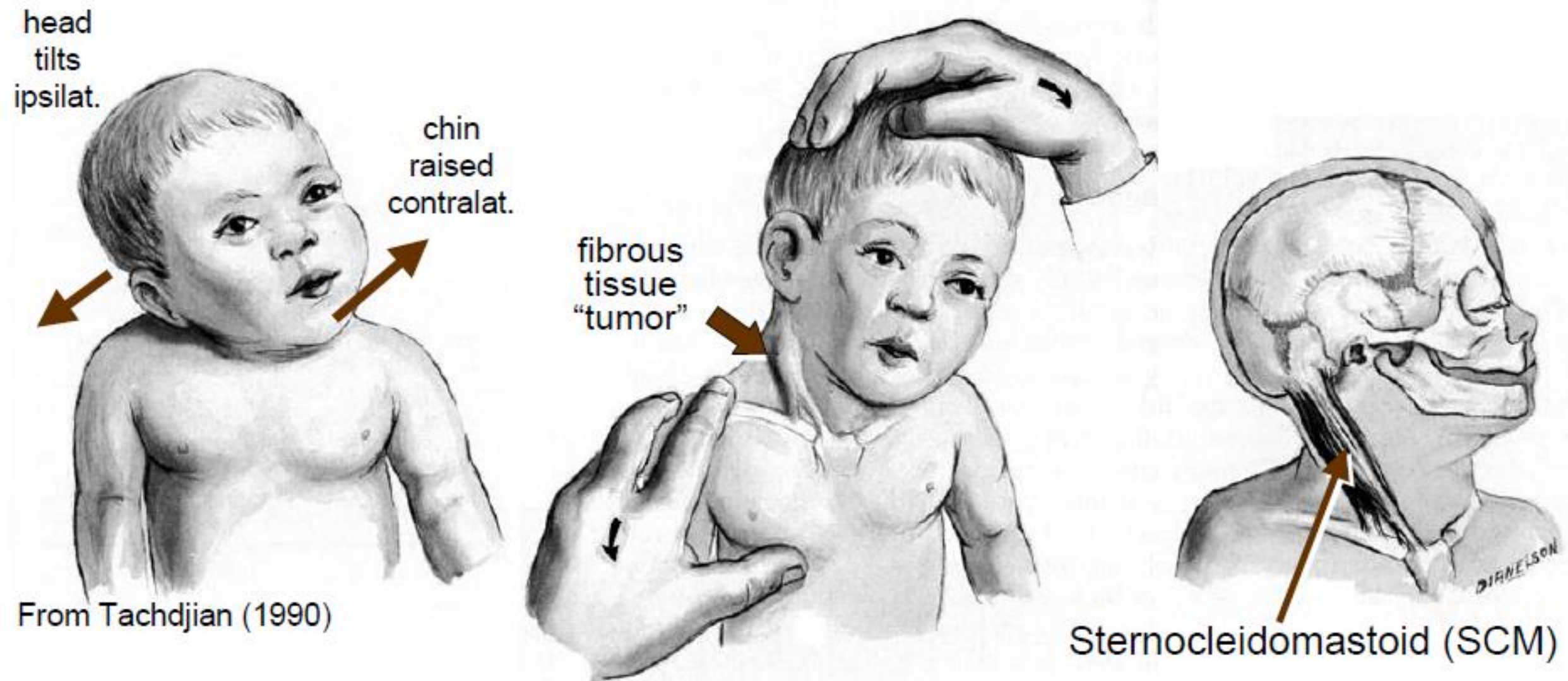
- Much rarer than UBPIs and Erb's Palsy
- Loss of C8 & T1 results in major motor deficits in the muscles working the hand: "claw hand"
- Loss of sensation to medial aspect of upper extremity



Anterior view



Congenital Muscular Torticollis



- Fibromatosis colli that develops in SCM probably prior to birth, although birth trauma (e.g., forceps) has also been implicated
- 75% of cases on right side
- SCM is transformed into a cordlike, nonfunctional muscle, distorting head and neck posture and altering growth of the face
- Etiology is unclear: Arterial or venous obstruction? Intrauterine malposition?

①

FRACTURES OF UPPER LIMB

Dr. KM.

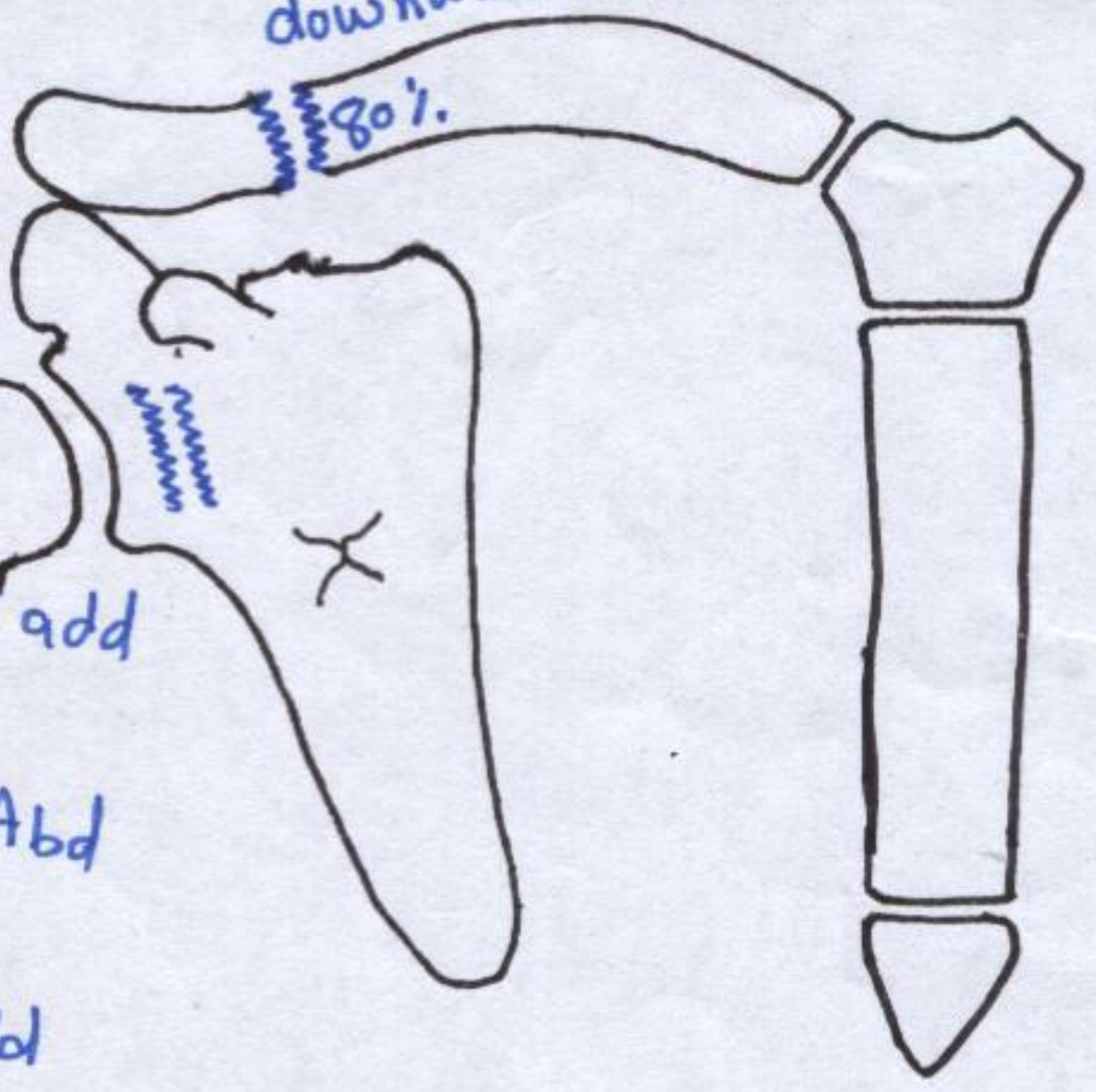
SCAPULA *

- * Trauma :- usually by high-speed vehicle accident (direct) ^{rarely indirect}
 - It is rare (protected space of scapula) and if occurs usually associated with severe chest trauma
- * Displacement :- (mostly * occur in body but may in neck of scapula)
 - over 90% of scapular * are not displaced
- * Diagnosis :- chest x-ray (may be missed), CT scan
- * Treatment :- most scapular * managed without surgery.
 - surgical reduction is required in neck or glenoid *.

CLAVICLE *

- * Trauma :- mechanism mainly indirect (fall on outstretched hand) but may be direct trauma.
- * Pathology :- commonest site is middle $\frac{1}{3}$ (80%) [Proximal 5%, distal 15%]
common in children (unites rapidly & no complications).
- * Displacement :- usually distal fragment displaces downward & medial.
- * C/Picture :- Pain & tenting of skin, tenderness, LOM, --- etc
 - arm clasped to chest (to prevent movement)
 - s/s of complication
- * Treatment :- reduction, immobilization in arm sling (1-2 wk) with rehabilitation (early movement once pain subsides).
 - distal $\frac{1}{3}$ * if displaced (or any $\frac{1}{3}$ if ends > 2cm apart)
do open reduction & internal fixation (ORIF)
- * Complications :- usually only cosmetic bump.
 - non union/mal union, stiffness, chest pneumothorax
 - nerve (brachial), vascular injury --- etc

downward & Medial



Supraspinatus
MS

add

Abd

Deltoid
tuberosity

Add

supracondylar
#

extension

shaft of
ulna & #
shaft of
radius

Monteggia # & dislocation
Night stick

Colles
#

Galazzi # & dislocation

Scaphoid
#

Bennette
#

Roband

Boxers #

खडीजा

(2)

HUMERUS *

old pt as $\left\{ \begin{array}{l} * \text{NOF} \\ * \text{Colles's} \end{array} \right.$

I * Fracture of proximal humerus

* Mechanism :- fall on outstretched hand. (FOOSH) or direct.

* Pathology :- may involve surgical neck, one or both humeral tuberosities. [displacement usually in adduction]!

- Common in old age group (especially osteoporotic)
in young need high-energy trauma.

Neer's classification :-

G-I :- no displacement

G-II :- neck * + displacement.

G-III :- " " + " " + one tuberosity *.

G-IV :- " + " " + two " "

* Dx & C/P :- X-ray, c/o pain, tenderness, bruises, s/s of complication

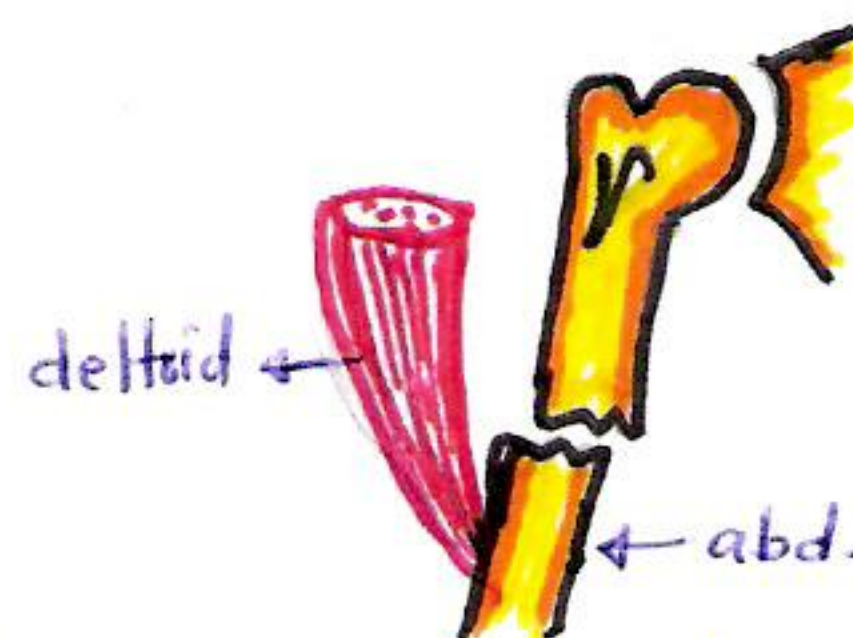
* Treatment :- G-I :- arm sling.

G-II :- closed reduction + immobilization. "shoulder spica"

G-III :- open reduction & internal fixation (ORIF)

G-IV :- prosthetic replacement → risk of avascular necrosis

* Complications :- AVN (avascular necrosis), axillary nerve palsy, non-union, malunion, stiffness, arthritis.



II - Humeral shaft *

* Mechanism :- FOOSH (fall on out stretched hand) or direct trauma

* Pathology :- FOOSH → spiral *, fall on elbow → transvers or oblique *
direct blow → comminuted *

displacement in abduction if above deltoid insertion
but in adduction if below it

* Dx & C/P :- X-ray (AP-Lat), c/o Pain, swelling, bruises
(must test radial N. before & after treatment).

* Treatment :- commonly non-operative (closed reduction & immobilization in cast from shoulder to wrist with elbow flexion 90°).

- if failed do ORIF "compression plate & screw / intramedullary nail"

* complication :- radial N. injury, non/malunion, compartment syndrome
if radial N. not recover in 3-4 month → EMG

III * around elbow

① Supra-condylar * :-

- It is one of the commonest & most imp. * in children

* Mechanism :- Fall on out stretched hand (FOOSH)

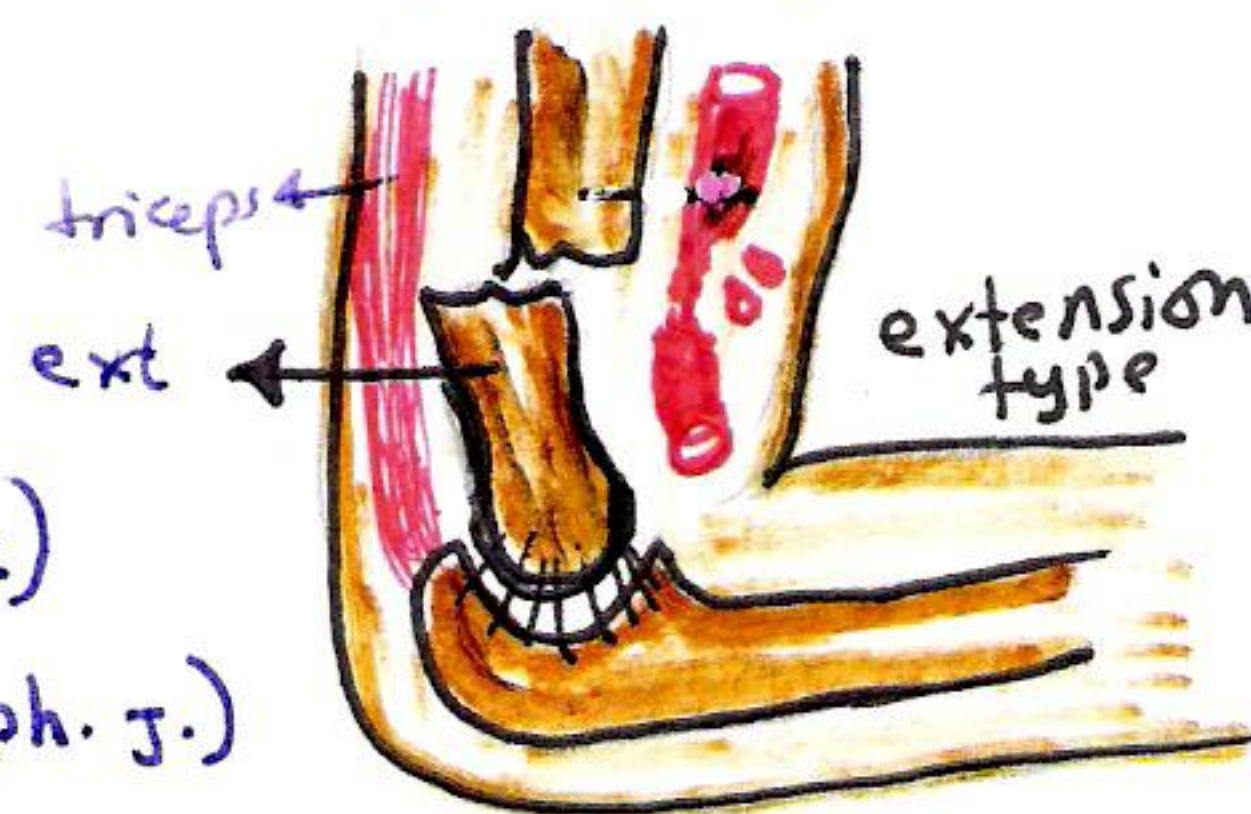
* Pathology :- displacement commonly of extension type (95%)
but may be flexion type (5%)

* Dx & C/P :- - X-ray (AP/Lat)
- c/o Pain, LOM, etc

* Treatment :- undisplaced → cast in flexion (3 wk)
(from shoulder to metacarpoph. j.)

- displaced * → reduction & immobilization by K-wires
(percut. pinning) & cast @ elbow flexed 90°

* Complication :- - vascular injury (brachial a), median, ulnar or radial N. inj
- malunion, compartment syndrome, stiffness, myositis ossificans
→ with cubitus valgus → ulnar neuropathy
- late deformity as Volkmann's contracture, claw hand, etc



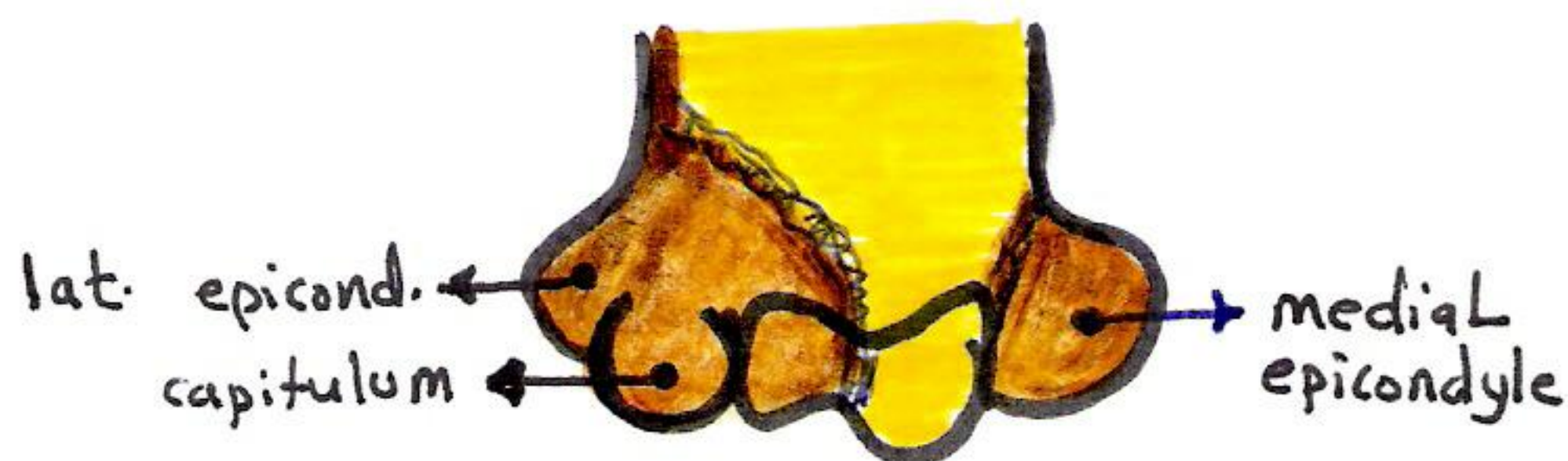
② Epicondyle *

* Medial epicondyle * :-

- commonly in children, it is a avulsion * pulled by flexor ms.
- treated by cast for 3 wk, if displaced → may need ORIF
- complicated by ulnar N. injury, etc.

* Lateral condyle * :-

- Lateral condyle include (Lat. epicondyle, capitulum & lateral part of trochlea)
- commonly in children due to FOOSH, * bone pulled by extensor ms.
- usually treated by ORIF (because intraarticular *).
- complicated by osteoarthritis, ~~non~~ union, cubitus valgus
(arrest of growth on lateral side) → delayed ulnar neuritis.



③ Olecranon *

* Mechanism :- direct trauma (fall onto the point of elbow).

* Dx & c/p :- x-ray (AP-lat) — c/o Pain, loss of active extension

* Pathology :- may be avulsion, transverse or comminuted *

* Treatment :- undisplaced (< 2cm, stable) → cast (elbow 45° flexion)

- Displaced → ORIF [if transverse → long screw,
if avulsion or comminuted → excise & triceps reinserted]

* Complication :- osteoarthritis, nonunion



ULNA & RADIUS *

① Monteggia * dislocation :-

* Definition :- fracture of proximal ^{upper 1/3} ulna & dislocation of head of radius (proximal radio-ulnar joint).

* Mechanism :- FOOSH, hyperpronation or direct.

* Pathology :- ① anterior type (common) → ant dislocation of head of radius & forward angulation of ulna
② posterior type (rare) → reverse

* Treatment :- ORIF (open reduction & IF)
— 1st restore length of ulna by reducing * then replace head of radius.



* Complications :- radial head * / ^{re}dislocation, non/malunion.
— posterior interosseous N. injury in 20% → Poor wrist ^{& finger.} extension

② Galeazzi * dislocation :-

* Definition :- * of radius (at junction of middle & lower 1/3) & dislocation of distal (inferior) radio-ulnar joint.

* Treatment :- ORIF as Monteggia *.

(5)

③. Colles' fracture :-

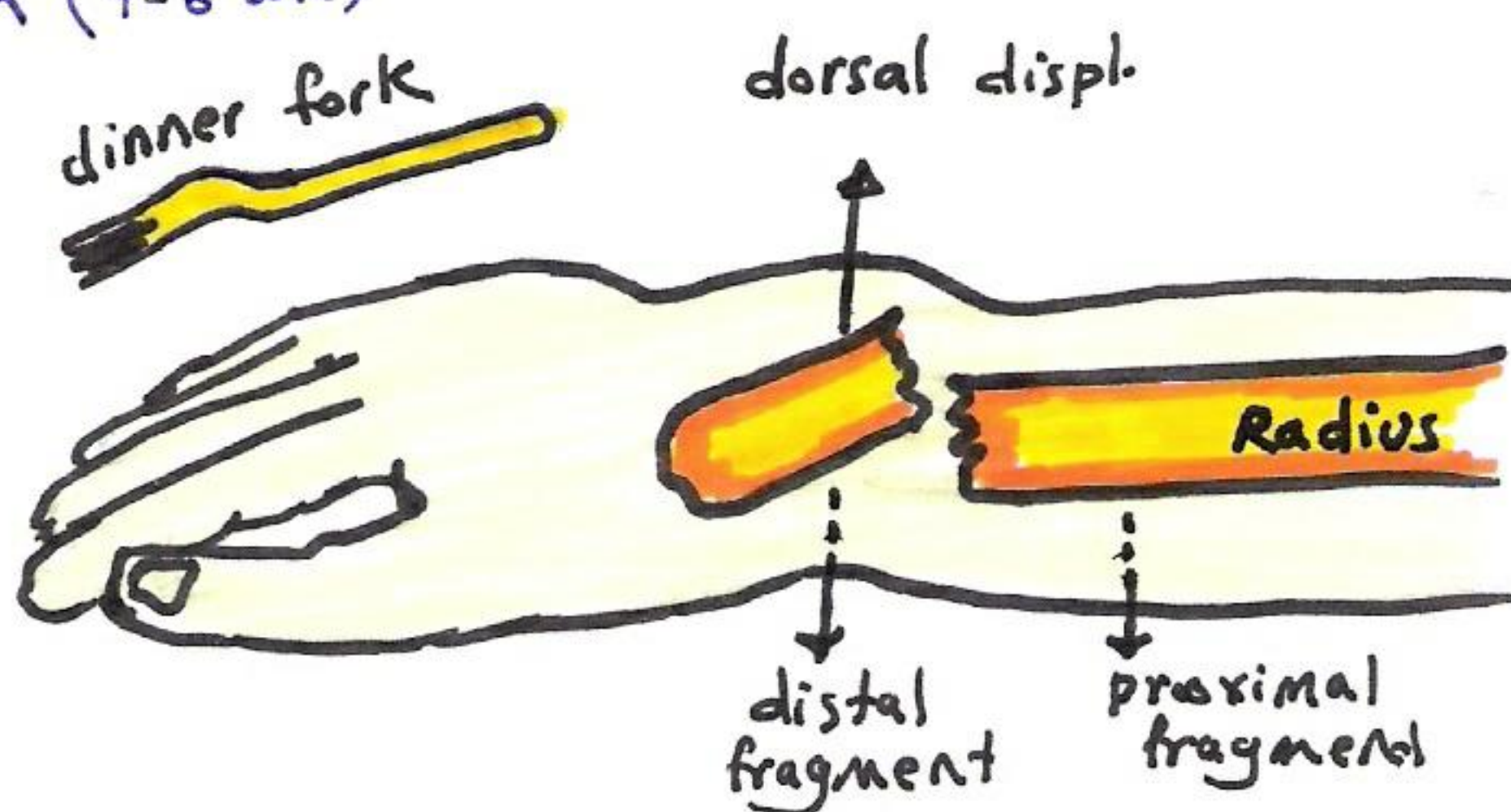
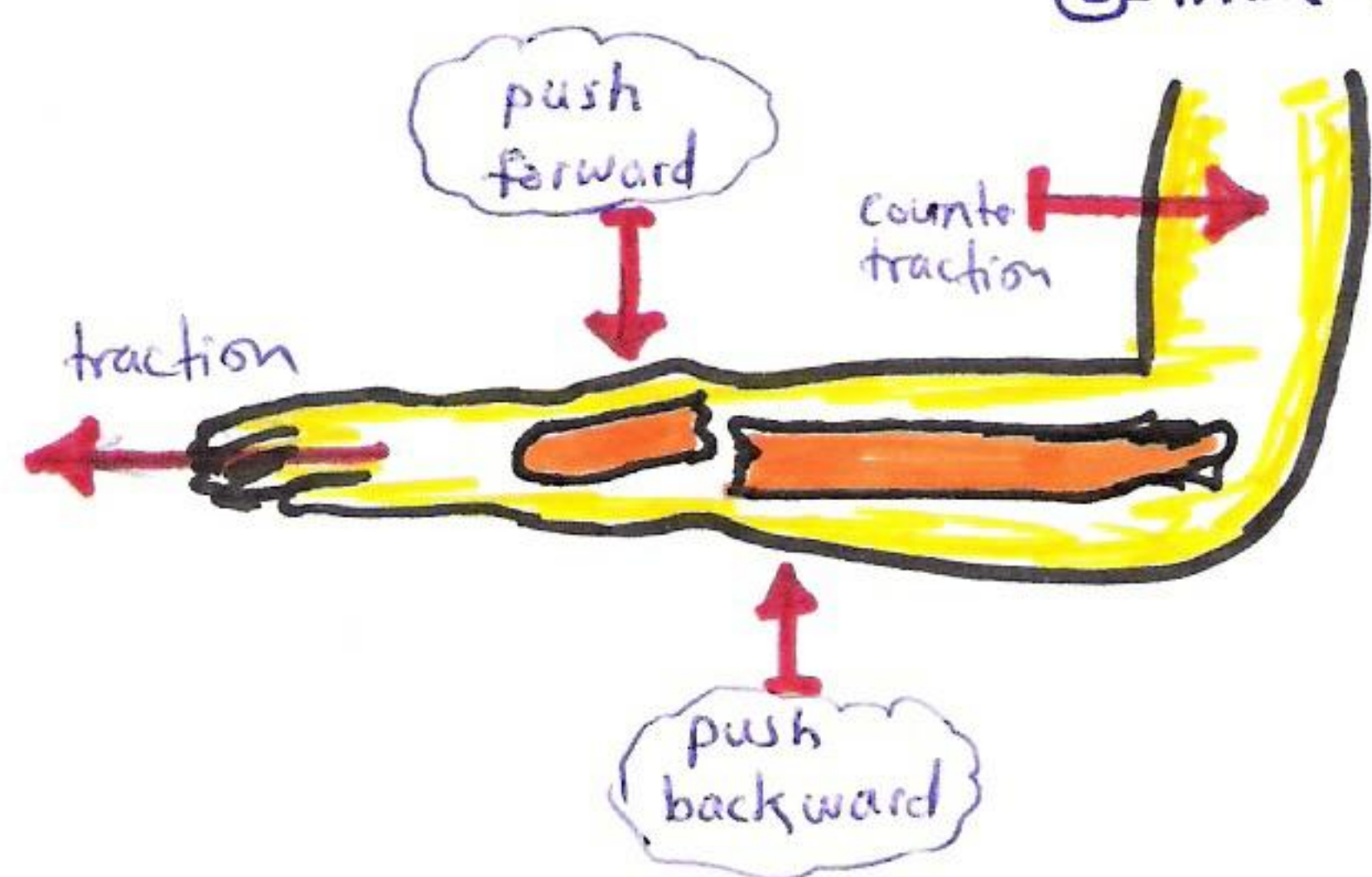
* Definition :- fracture of the distal end of radius (2 cm above wrist) with dorsal (backward) displacement. + supination
- Most common * in women > 40 "osteoporosis"

* Mechanism :- FOOSH (fall on outstretched hand).

* Pathology :- distal fragment of * displaced dorsally → marked prominence with dinner-fork appearance. ± lateral tilt

* C/P :- swelling, ecchymosis, tenderness, dinner-fork deformity

* Treatment ① closed reduction under GA → thenar grip method
[apply traction on fingers with counter traction of arm with flexed elbow.
• put ^{your} thenar eminence over distal fragment (pressing forward) and other hand thenar over proximal fragment (press backward).
• push distal fragment to ulnar side & pronate it.]
② immobilization (4-6 wk)

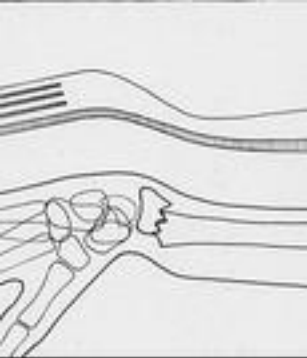


* Complications :-
• subluxation of inferior radioulnar joint
- joint stiffness, osteoarthritis, Sudek's atrophy
- tendon injury (extensor pollicis longus tendon rupture)
occurs after 4-8 wks
may need tendon transfer
ET

④. Smith's fracture :-

- It is the reverse of Colles' fracture. (forward displacement) = Volar + pronation
* lower end of radius ±

⑤. Barton * :- Intra articular * of distal radius + wrist dislocation







⑥

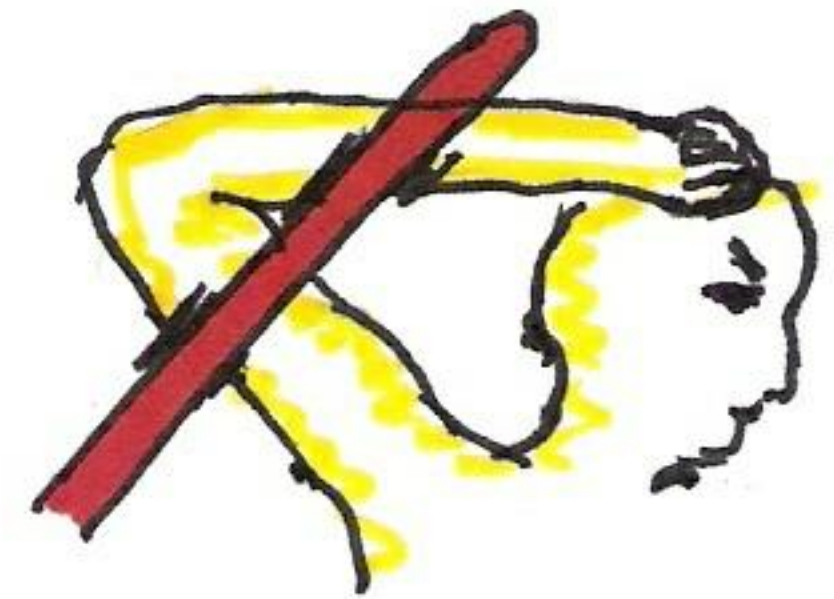
⑥ Radial head * :-

* Mechanism :- FOOSH, common in young adults.
"in children $\rightarrow$ * Neck of radius."

* treatment :-

- ① Adult
 - ① • undisplaced $\rightarrow$ rest in arm sling.
 - Mason class { ② • displaced $\rightarrow$ ORIF (if angulation $> 30^\circ$)
 - ③ • comminuted $\rightarrow$ excision head $\pm$ prosthesis
 - ④ • comminuted + elbow dislocation $\rightarrow$ as ③
- ② children
 - displacement $< 30^\circ \rightarrow$ rest in sling.
 - displacement $> 30^\circ \rightarrow$ open or close reduction
(NEVER EXCISE in children)

* NB:- Nightstick * :- is isolated * of the ulna, due to direct blow to forearm (holding up arm protect face)





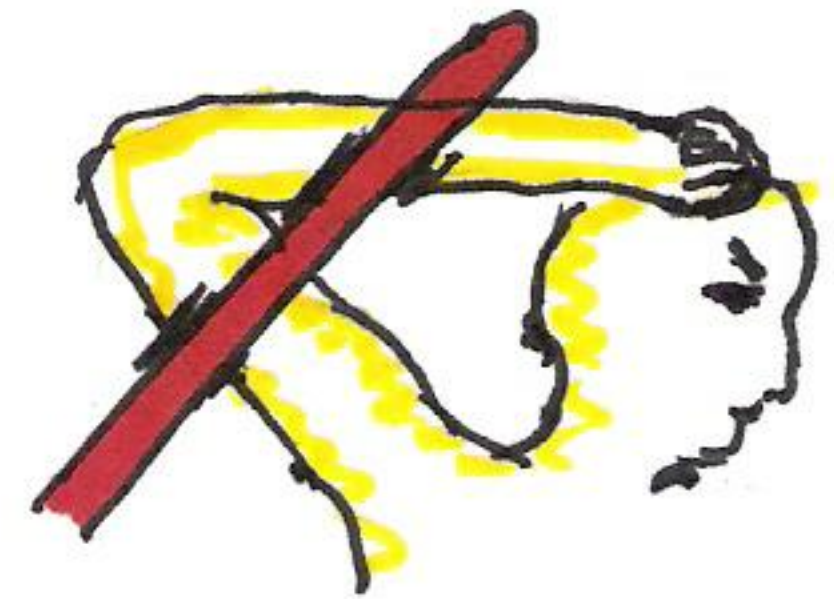
⑥

⑥ Radial head * :-

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② undisplaced $\rightarrow$ rest in arm sling.
③ displaced $\rightarrow$ ORIF (if angulation $> 30^\circ$)
④ comminuted $\rightarrow$ excision head $\pm$ prosthesis
⑤ comminuted + elbow dislocation $\rightarrow$ as ③
⑥ children
• displacement $< 30^\circ \rightarrow$ rest in sling.
• displacement $> 30^\circ \rightarrow$ open or close reduction
(NEVER EXCISE in children)

* NB:- Nightstick * :- is isolated * of
the ulna, due to direct blow
to forearm (holding up arm protect face)



SCAPHOID *

* Mechanism :- FOOSH, common in young men

* Pathology :- usually transverse * & no displacement
- the most common * around wrist.

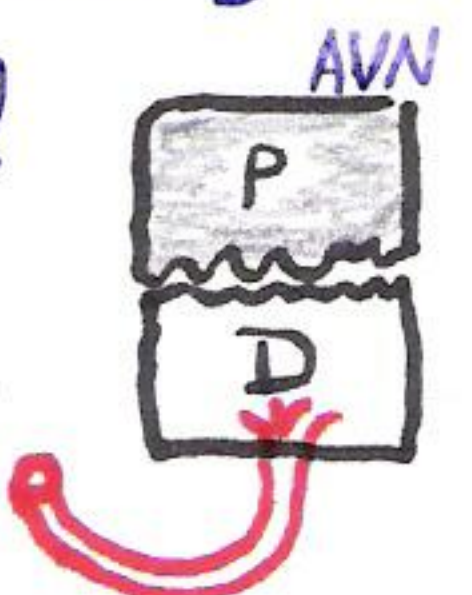
* C/P :- pain on wrist movement, tenderness in anatomical
snuffbox, [usually undisplaced.]

* Dx :- x-ray AP/Lat/scaphoid view (wrist extended & ulnar deviation)
 $\pm$ bone scan, $\pm$ CT scan. (if Dx clinical)
(x-ray may be -ve in 1st 2 wk so $\uparrow$ treat as scaphoid
* and re-xray 2 wk later.)

* Treatment :- undisplaced $\rightarrow$ Plaster (extend from elbow to
metacarpopharyngeal joint covering proximal phalanx
of the thumb).

- displaced $\rightarrow$ reduction + immob. (IF may needed)

* Complication :- AVN (avascular necrosis) $\rightarrow$ of proximal
fragment [scaphoid supplied from distal only]



METACARPAL BONE *

*Boxer's fracture :-

- fracture of the base^{neck} of the 5th metacarpal bone

*Bennett's * :-

- intraarticular * of base of the 1st M.C. bone
→ most c

*Rolando * :-

- comminuted intra-articular * of base of 1st M.C bone

N.B.: Bennett's * is the most common type of thumb *

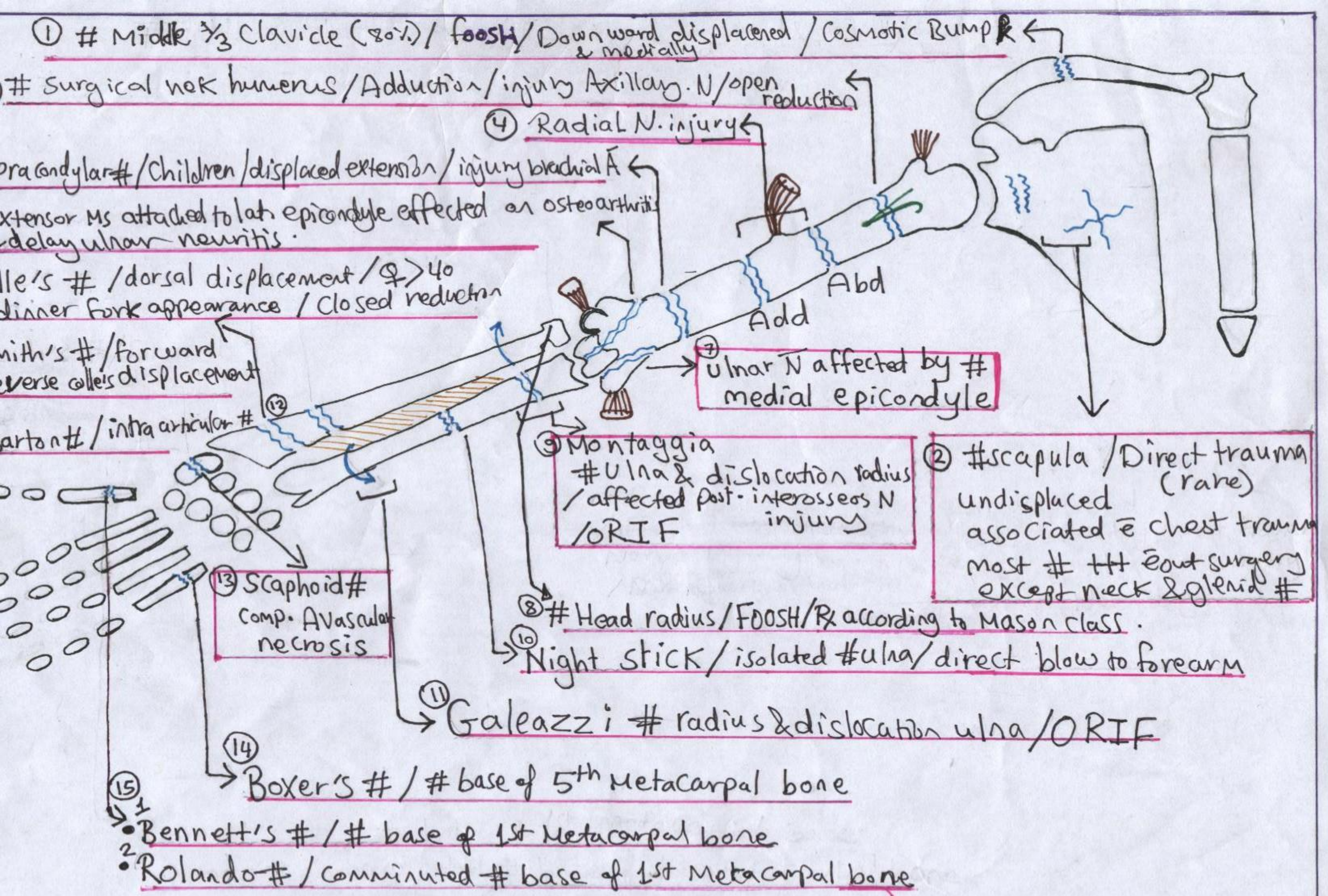
N.B.:- * around elbow

- 1- supracondylar * of humerus
- 2- Monteggia * disL.
- 3- proximal (head) of radius
- 4- epicondylar *

N.B.: * around wrist :-

- 1- Galeazzi * disL.
- 2- Colle's *
- 3- Smith & Barton *

N.B.: * of femur common in adult (due to RTA)
in old (due to metastasis)



① # Middle $\frac{2}{3}$ Clavicle (80%) / FOOSH / Downward displaced & medially / Cosmetic Bump R ←

③ # Surgical neck humerus / Adduction / injury Axillary N / open reduction ←

④ Radial N. injury ←

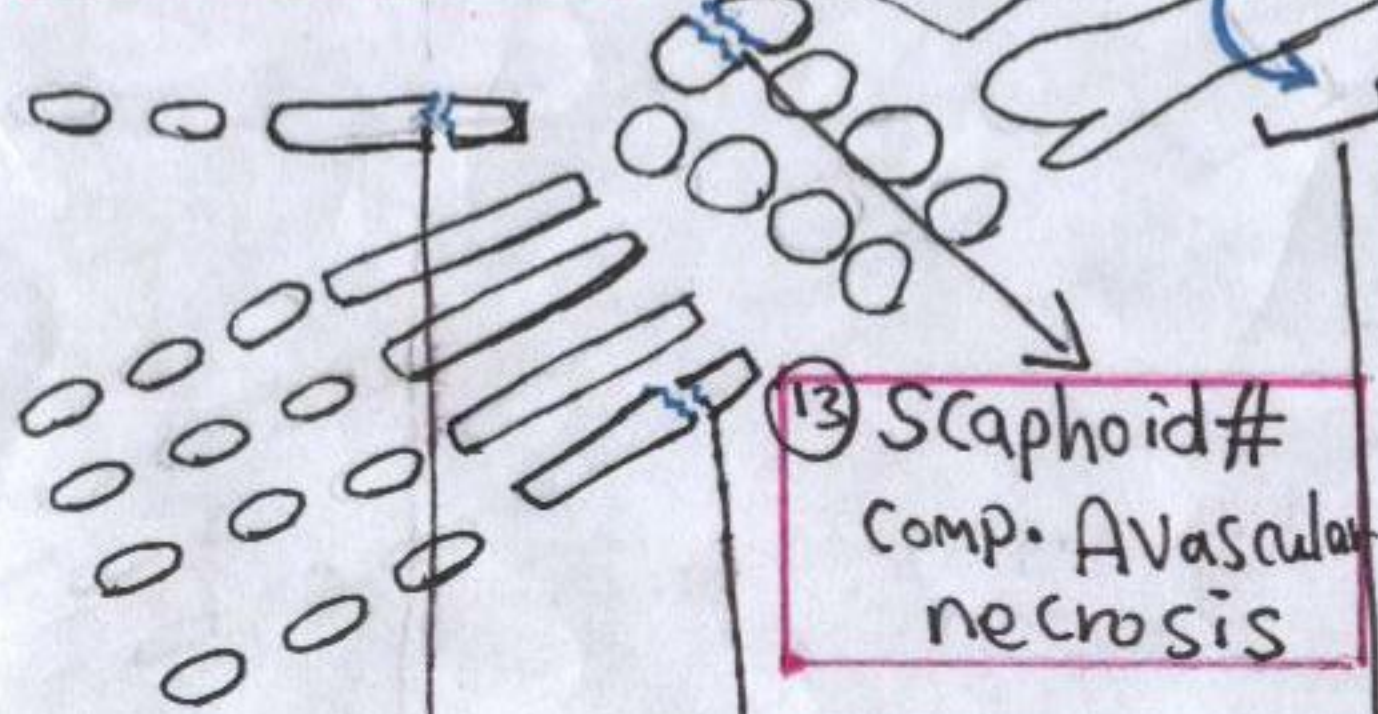
⑤ Supracondylar # / Children / displaced extension / injury brachial A ←

⑥ extensor MS attached to lat. epicondyle effected on osteoarthritis & delay ulnar neuritis.

⑫ 1. Colle's # / dorsal displacement / ♀ > 40 / dinner fork appearance / Closed reduction

2. Smith's # / forward / reverse colle's displacement

3. Barton # / intra articular #



⑨ Monteggia
Ulna & dislocation radius
/ affected post. interosseous N
injury / ORIF

② # scapula / Direct trauma (rare)
undisplaced associated chest trauma
most # + chest trauma
except neck & glenoid

⑧ # Head radius / FOOSH / R according to Mason class.

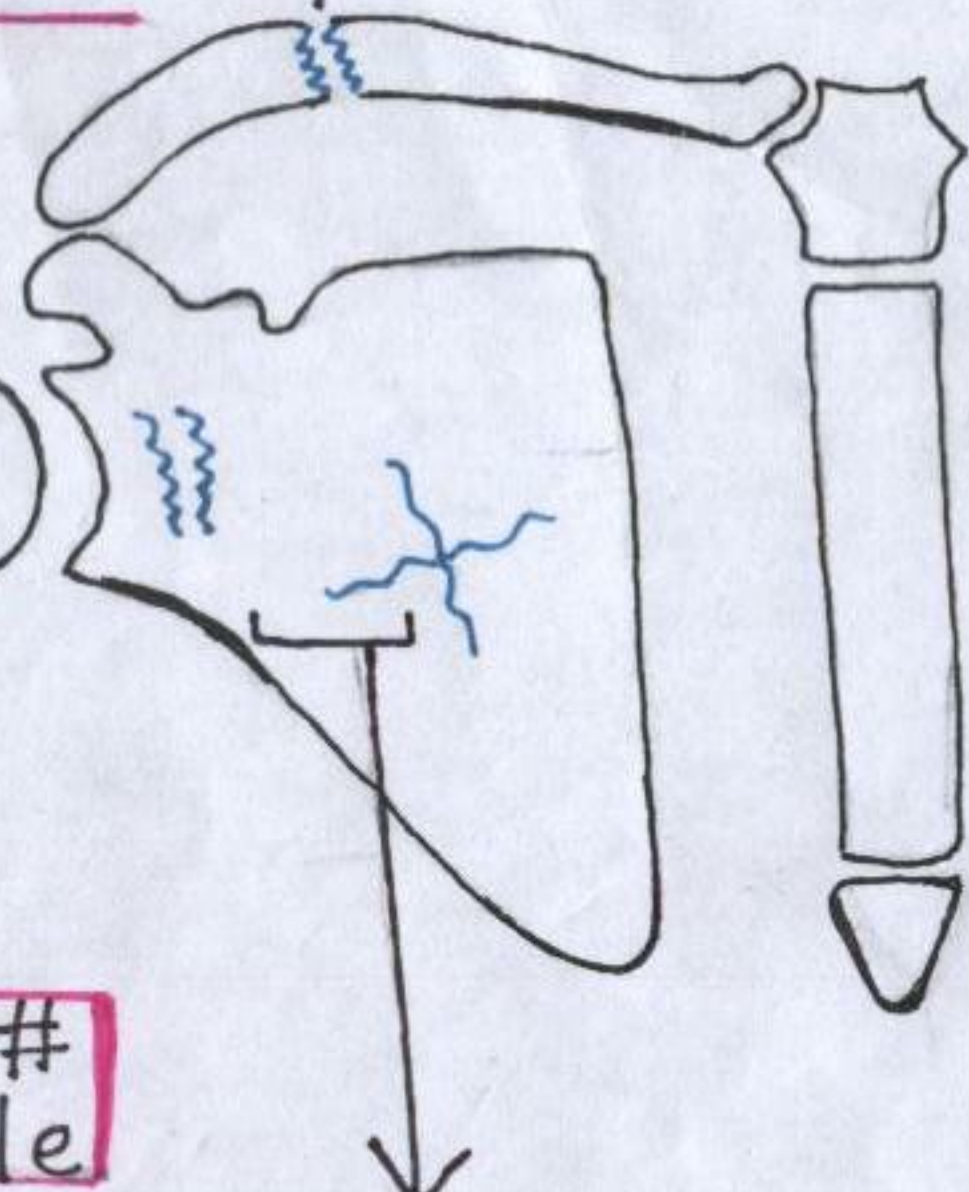
⑩ Night stick / isolated # ulna / direct blow to forearm

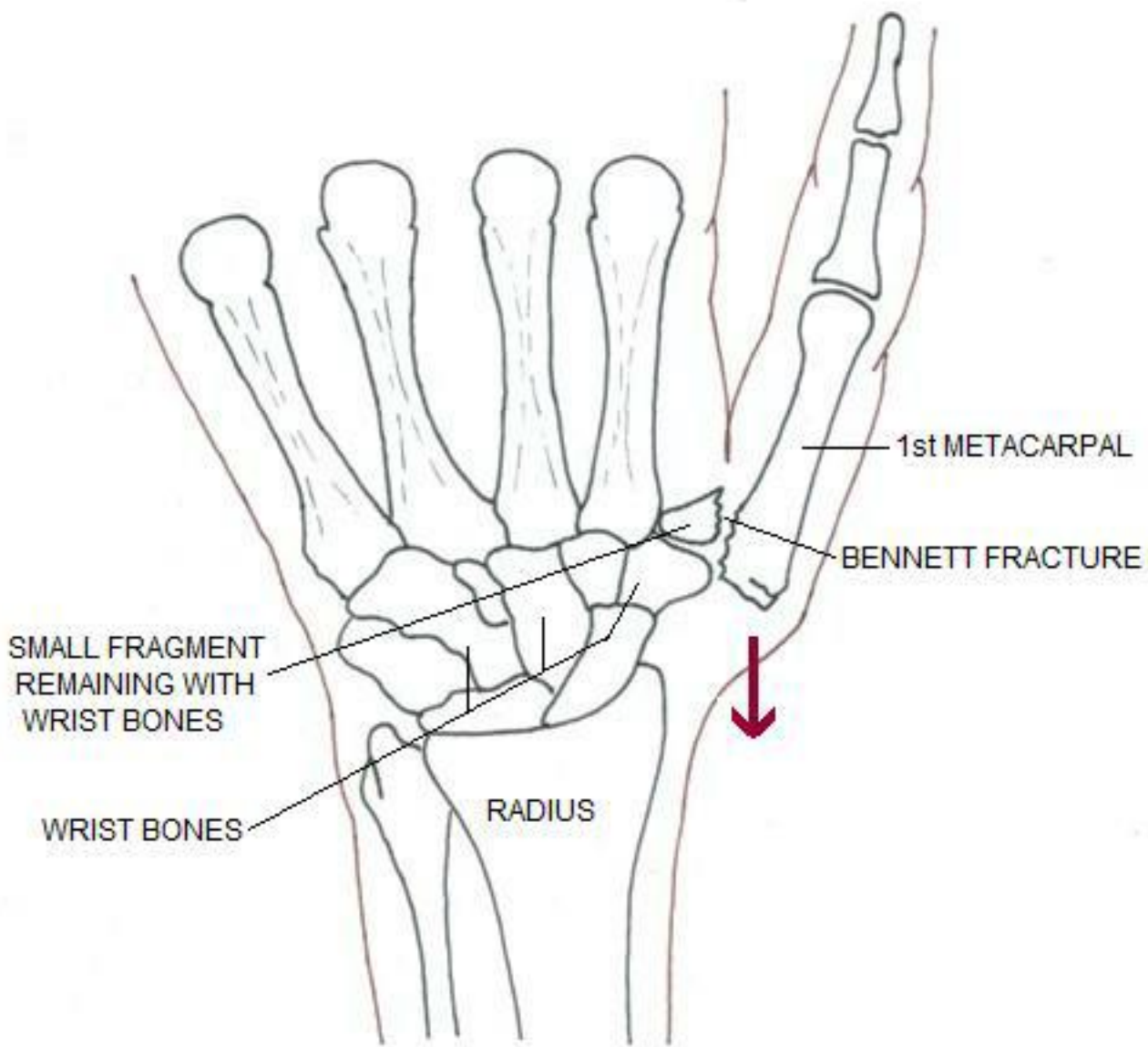
⑪ Galeazzi # radius & dislocation ulna / ORIF

⑭ Boxer's # / # base of 5th Metacarpal bone

⑮ 1. Bennett's # / # base of 1st Metacarpal bone

2. Rolando # / comminuted # base of 1st Metacarpal bone





BENNETT FRACTURE

DISLOCATIONS OF UPPER LIMB

SHOULDER DISLOCATION

- The glenohumeral (shoulder) joint is the most commonly dislocated joint in the body since stability is sacrificed for motion.

* Prognosis :-

- recurrence rate depends on age of 1st dislocation [$<20\text{yr} = 65-95\%$,
 $20-40\text{yr} = 60-70\%$, $>40\text{yr} = 2-4\%$]

Toronto notes

* complications :-

- 1- associated fracture of tuberosity, glenoid rim.
- 2- rotator cuff tear, shoulder stiffness.
- 3- recurrent/unreduced dislocation.
- 4- injury to axillary N/artery, brachial plexus injury.

* Types :-

- 1- Anterior dislocation.
- 2- Posterior dislocation.
- 3- recurrent ant. dislocation.
- 4- others as habitual dislocation

I Anterior dislocation :- " $>90\%$ "

Toronto notes

* Mechanism :-

- indirect :- FOOSH (abducted & externally rotated arm)
- direct :- blow to posterior shoulder.

* Clinical Picture :-

- Pain, deformity, arm slightly abducted with external rotation, the elbow is supported by the other hand, Limited all movement.

* investigation :-

- X-ray (AP/Lat) → humeral head medial & inf. to glenoid fossa
(head of humerus first dislocate inferiorly then anteriorly to subcoracoid position) → subglenoid.

* Treatment :-

[A] Reduction :- closed reduction under G.A

① Kocher's method :-

- apply downward traction with (90° elbow flexion)
- then do external rotation for 5-6 min.
- Adduct the arm (by crossing elbow in front body to midline) then rapidly rotate it medially.
(traction → lateral rotation → adduction → medial rotation).

② Hippocratic method :-

- apply traction of extended, semi abducted arm with counter traction using foot in axilla. -
- direct backward pressure over humeral head.
(risk brachial plexus injury therefore not recommended).

[B] Immobilization :-

- arm sling for 3 weeks ↑ strap arm to trunk (add + MR). followed by rehabilitation
- check post-reduction X-ray & neurovascular status.

II Posterior dislocation :-

* Mechanism :-

- ADD
- direct :- blow to anterior shoulder.
 - abduction & medial rotation → epileptic seizure, electric shock.

* Clinical Picture :-

- arm held in adduction & medial (internal) rotation.
- flat shoulder, prominent coracoid, complete LOM (limitation of move.)

* investigation :-

- x-ray :- AP/Lat + axillary view (trans-scapular).
(N.B dislocation may be missed in AP view)
- finding are :-
 - 1- empty glenoid fossa
 - 2- head of humerus directed upward (N. medially)
 - 3- electric light bulb appearance of head.

* Treatment :-

- [A] Reduction :- closed reduction under G.A → Lateral rotation of the arm with direct forward pressure upon head of humerus.
- [B] Immobilization :- in arm sling or shoulder spica for 3 weeks followed by rehabilitation

NB :- post. dislocation only complicated by recurrence

III Recurrent dislocation

* Mechanism :-

- recurrent trauma, lax ligament & capsule.
- dislocation occur when arm abducted, extended & laterally rotated e.g during combing the hair.
- ↳ (the capsule & glenoid labrum stripped from ant. margin of glenoid rim)

* Diagnosis :-

- O/E → +ve apprehension test.
- x-ray (axillary view) : → • Hill-Sachs lesion : divot (depression) on post. superior part of head of humerus [due to forceful impaction against glenoid rim]
 - bony Bankart lesion :- avulsion of the anterior glenoid labrum (with attached bone fragment) from glenoid rim.

* Treatment :- $\longrightarrow$ operative.

① Putti-Plat operation :-

- the subscapularis & capsule are shortened & tightened by overlapping or reefing [to limit external rotation].

② Bankart operation :-

- reattachment of glenoid labrum & capsule.

③ Others as - Bristow operation :-

- reinforcement of ant. inf. capsule.

- Bone - block operation :-

- bring coracoid in front of shoulder to prevent recurrent ant. dislocation.

IV Habitual dislocation :-

- Some people with very lax ligaments can dislocate the shoulder and reduce it over & over this referred to as habitual dislocation.
- It is ^{like} recurrent dislocation but painless.
- Can occur in other joints as elbow, patella... etc

NB :- if anterior dislocation is missed or neglected the ttt is :-

- if young $\begin{cases} < 6 \text{ wk dislocation} \longrightarrow \text{closed reduction} \\ > 6 \text{ wk} & \text{"} \longrightarrow \text{open} & \text{"} \end{cases}$
- if old $\begin{cases} \leq 3 \text{ wk} & \text{"} \longrightarrow \text{open} & \text{"} \\ > 3 \text{ wk} & \text{"} \longrightarrow \text{no ttt "supervision"} \end{cases}$



96x389 @ 27.3 t

Hill-Sachs lesion



188x181 @ 3.7 kb



400x362 @ 15.4 kb

STERNO-CLAVICULAR DISLOCATION

Anterior dislocation

- * Mechanism :- fall on the shoulder.
- * O/E :- visible & palpable prominence.
- * ttt :- closed reduction with direct pressure on front of joint.
(risk of recurrence, int. fixation risk of injury to vessels)

Posterior dislocation

- It is an emergency as may cause compression of large vessels in the neck, so must reduced immediately.

ACROMIO-CLAVICULAR INJURY

(A-C joint)

- * Mechanism :- fall onto shoulder with adducted arm (onto tip of shoulder) causing partial tear (subluxation) or complete tear (dislocation)
- * C/Picture :- palpable step deformity between clavicle & acromion (Toronto note)
 - pain with adduction / limited ROM ↳ if sublux. → no deformity
- * Diagnosis :- x-ray "stress view" → 5 kg in patient's hand →
dislocation more clear. 10 kg (د. محمد راشد)
- * Treatment :- Subluxation → arm sling (1-3 wk), ice, analgesia
 - Dislocation → open reduction, repair torn ligament & internal fixation w screw.
- * Complications :- osteoarthritis of A-C joint, failure of reduction
"treated by arthrodesis after open reduction"





ELBOW DISLOCATION

Posterior dislocation :- "common"

* Mechanism :- fall on outstretched hand (FOOSH).

* C/P :- Pain, LOM, elbow held in semiflexed position.

- O/E :- tip of olecranon felt higher than level of 2 epicondyles.

* Treatment :- closed reduction (pull forearm with semiflexed elbow)

- immobilisation in above elbow plaster & flexed elbow 90° for 3 wk followed by rehabilitation.

- neglected cases (>4 wk) do open reduction.

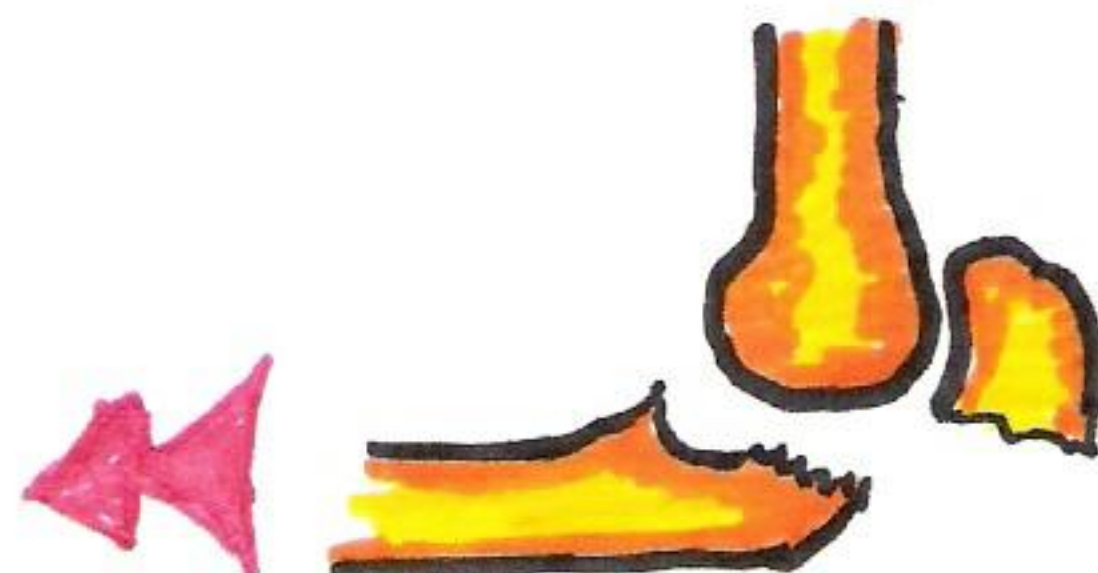


Anterior dislocation

* Mechanism :- fall onto tip of elbow

- usually olecranon is fractured.

* Treatment :- always operative :- reduce ulna & radius then fix the fracture.



WRIST DISLOCATION

"carpal disl."

* Mechanism :- FOOSH with hand rotation

* Types :- ① Lunate dislocation → volar (anterior)

② Perilunate dislocation → (the distal row mainly)

[N.B] - usually associated with scaphoid & especially perilunate disl.

[N.B] - mostly not diagnosed → chronic pain & wrist instability

Anterior lunate dislocation is the commonest and may lead to acute median N compression

Closed or open reduction with plaster 6-8 Wk

Frozen shoulder "Adhesive capsulitis"

* Definition :-

- Disorder characterized by progressive pain & stiffness of the shoulder, usually resolve spontaneously after 18 months.

* Mechanism (Pathology) :-

- 1- Primary adhesive capsulitis :- idiopathic, ^{may resolve in 9-18 months.} usually associated w/ DM
- 2- Secondary adhesive capsulitis :- due to prolonged immobilisation, following MI, stroke, shoulder trauma.

* Aetiology :-

- Unknown, capsule inflamm. → fibrosis → gradual pain

* Clinical Picture :-

- decreased active & passive ROM. x-ray → Normal
- Increased pain (affect sleeping) & stiffness...

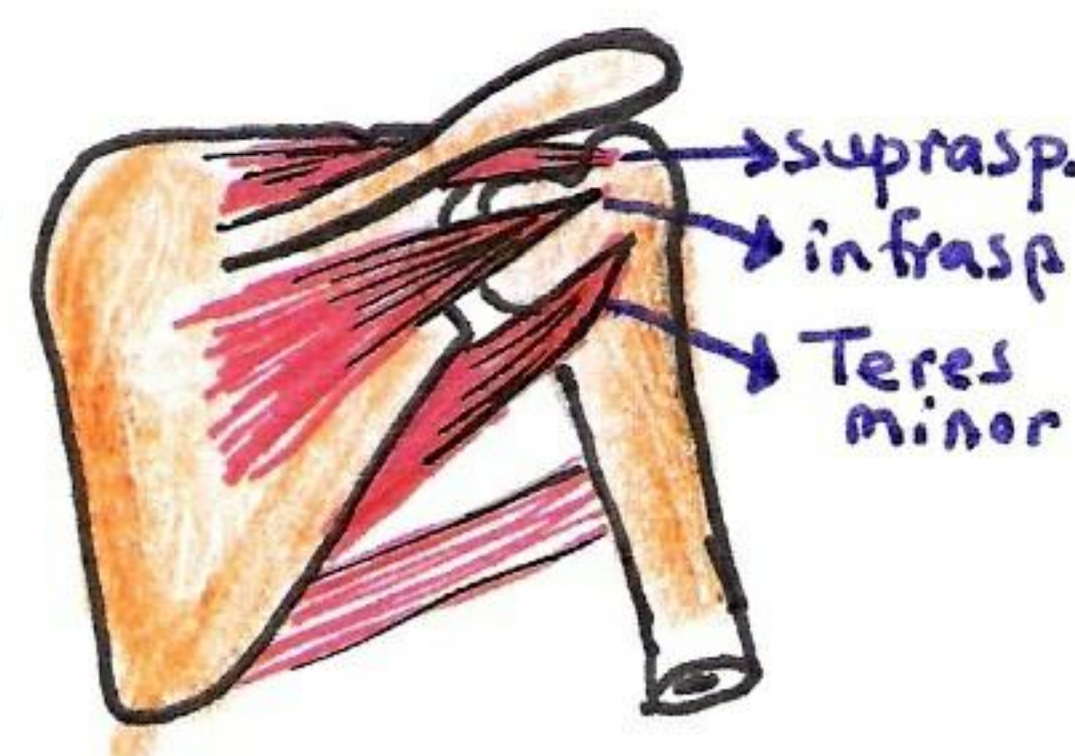
* Treatment :-

- physiotherapy, NSAIDs, arm sling intraarticular steroid injection
- Arthroscopic OR normal saline capsular distruption

Rotator cuff lesions

- * Rotator cuff consists of 4 ms (subscapularis, supraspinatus, infraspinatus and teres minor).

- all rotator cuff ms are inserted into greater tuberosity of humerus EXCEPT ~~teres minor~~ into **subscapularis** lesser tuberosity.
- rotator cuff ms stabilize shoulder during movement especially at abduction.



* Rotator cuff syndrome :-

- ① Acute tendinitis "calcified" → supraspinatus tendinitis
- ② Chronic tendinitis → Impingement syndrome.
- ③ Frozen shoulder → Adhesive capsulitis.
- ④ Rotator cuff tear.

⑦

gii: dislocation of upper

① Acute calcified tendinitis :-

- inflammation of supraspinatous tendon with calcification which removed later by macrophage more in young age.
- Unknown aetiology & resolve spontaneously in 2-3 Wk.
- Treated by NSAID, if no response $\rightarrow$ inject local steroid & anaesthesia. if recurrent cases $\rightarrow$ surgical removal of Ca^{++}

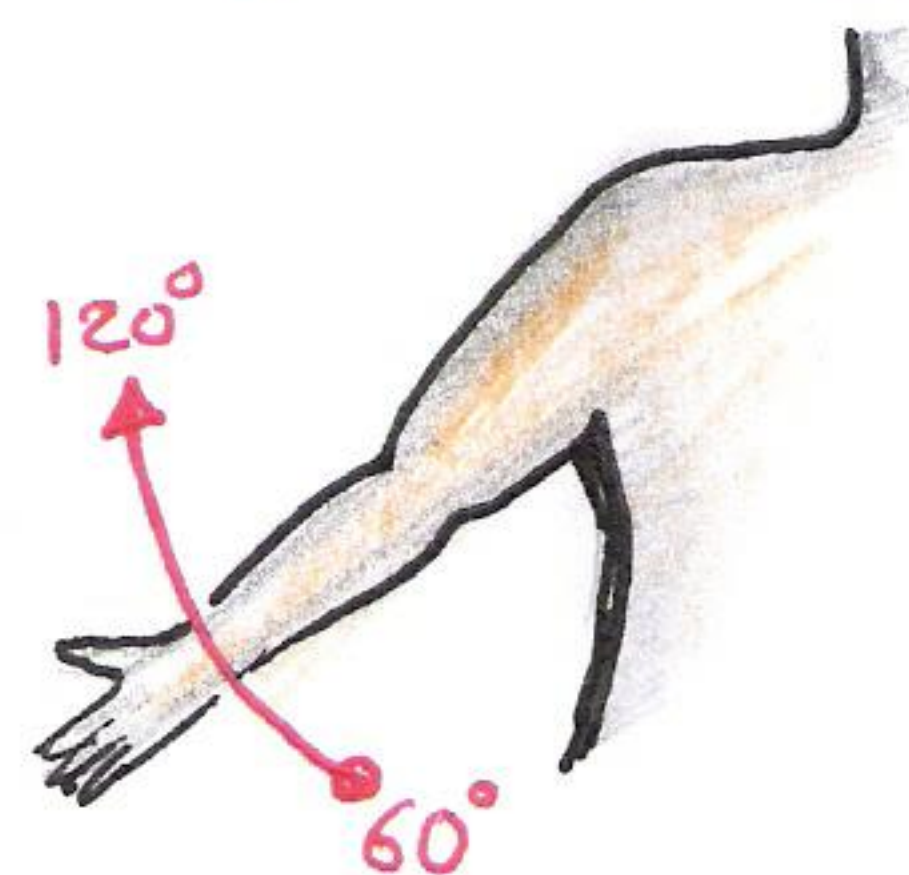
② Chronic tendinitis (impingement syndrome) (supraspinatous tendinitis) (Rotator cuff syndrome) :- Pain on abduction of shoulder with freedom of pain at extremities (between $60-120^\circ$)

Mechanism :-

- impingement of supraspinatous tendon by a subacromial bone spur, due to impingement by over use. [40-50 years]

* Clinical Picture :-

- Pain on abduction $60-120^\circ$
- ^{+ve} Drop-arm sign :- passive abduction of the arm above 120° then ask pt to adduct slowly $\rightarrow$ pt drop arm on reaching 120°
- ^{+ve} Neer's test :- Pain with passive forward flexion between $130-170^\circ$.

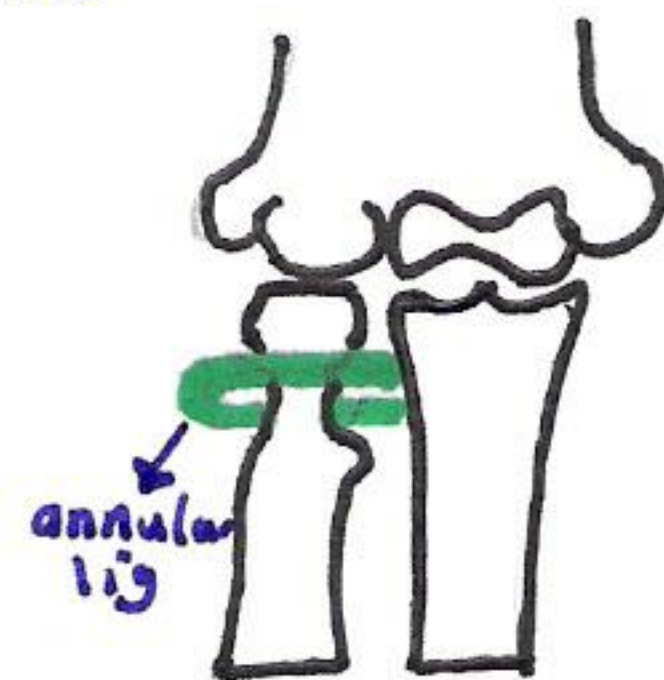


* Treatment :-

- mild (wear) :- $\rightarrow$ NSAIDs, physiotherapy.
- moderate (tear) :- $\rightarrow$ as mild $\pm$ steroid injection.
- severe (repair) $\rightarrow$ may surgical repair (pt cannot abduct).

Pulled elbow

- Annular ligament slips between head of radius & capitulum
- follows pull on child's forearm [rule out child abuse]
- Common at 2-6 yr [due to underdeveloped radial head]
- C/P :- forearm is pronated "in extension"



- Pain, LOM, tender radial head, pseudoparalysis of arm
- ttt :- closed reduction (gentle supination while moving from extension to flexion)
- may immobilize in 1 day in arm sling + pain relieve.

Epiphyseal injury

- Salter-Harris classification :-

- I (stable) :- transverse through growth plate, ttt: closed reduction.
 - II (above) :- through metaphysis & growth plate.
 - III (low) :- through epiphysis to plate & along growth plate
 - IV (through) :- through epiphysis & metaphysis.
 - V (Ram) :- crush injury of growth plate
- (Salter = Stable, above, low, through & Ram)



Type I



II



III



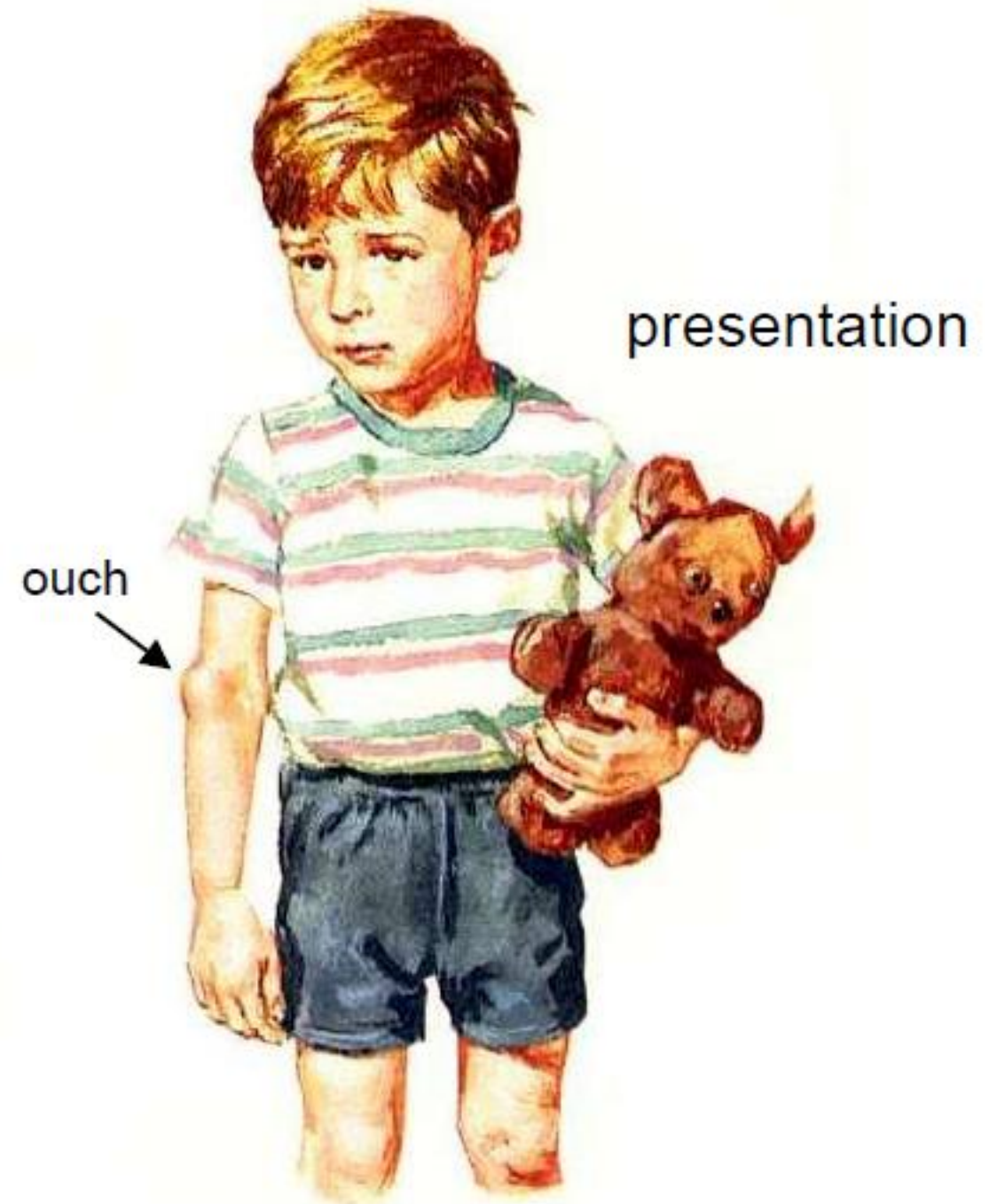
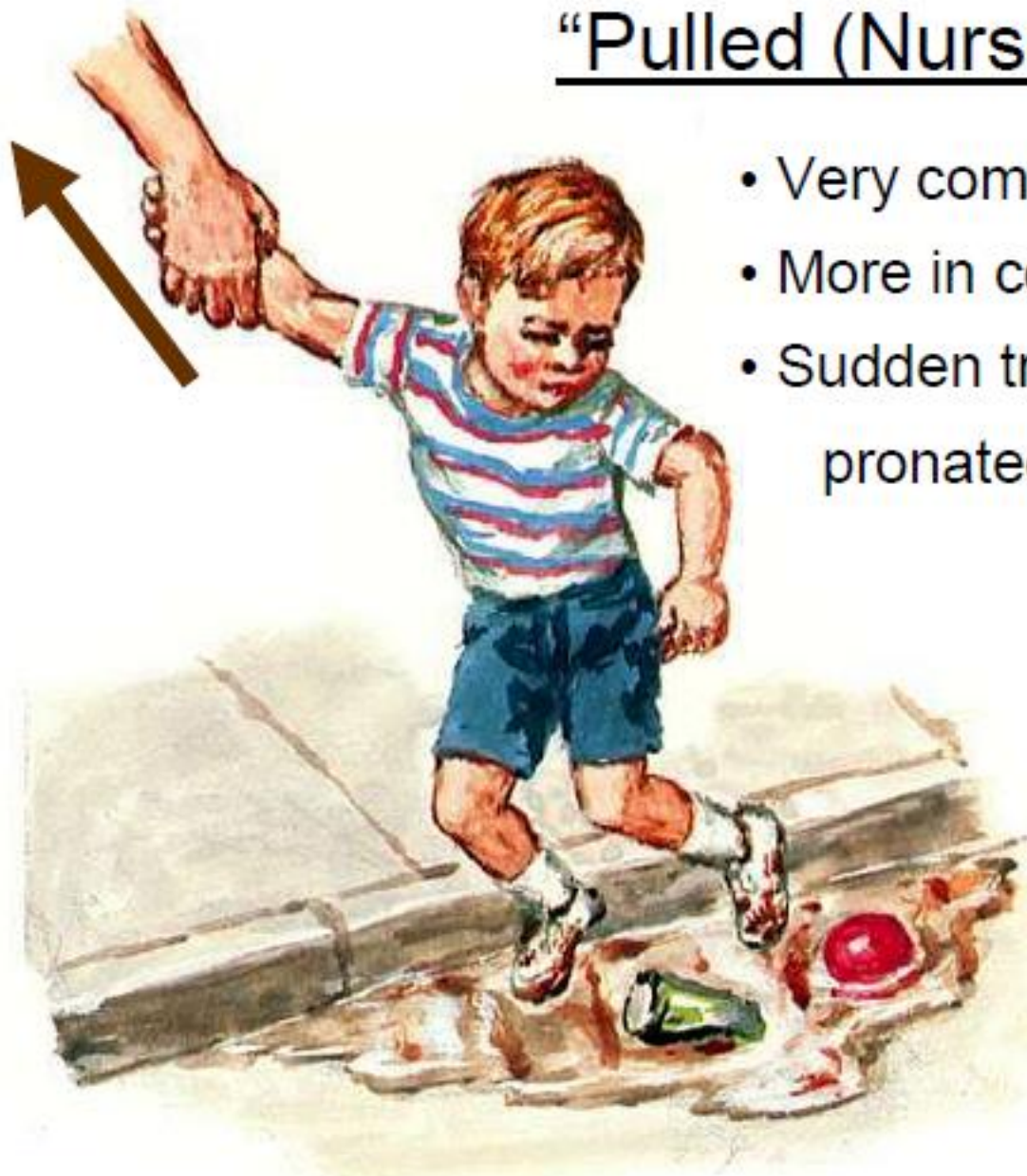
IV



V

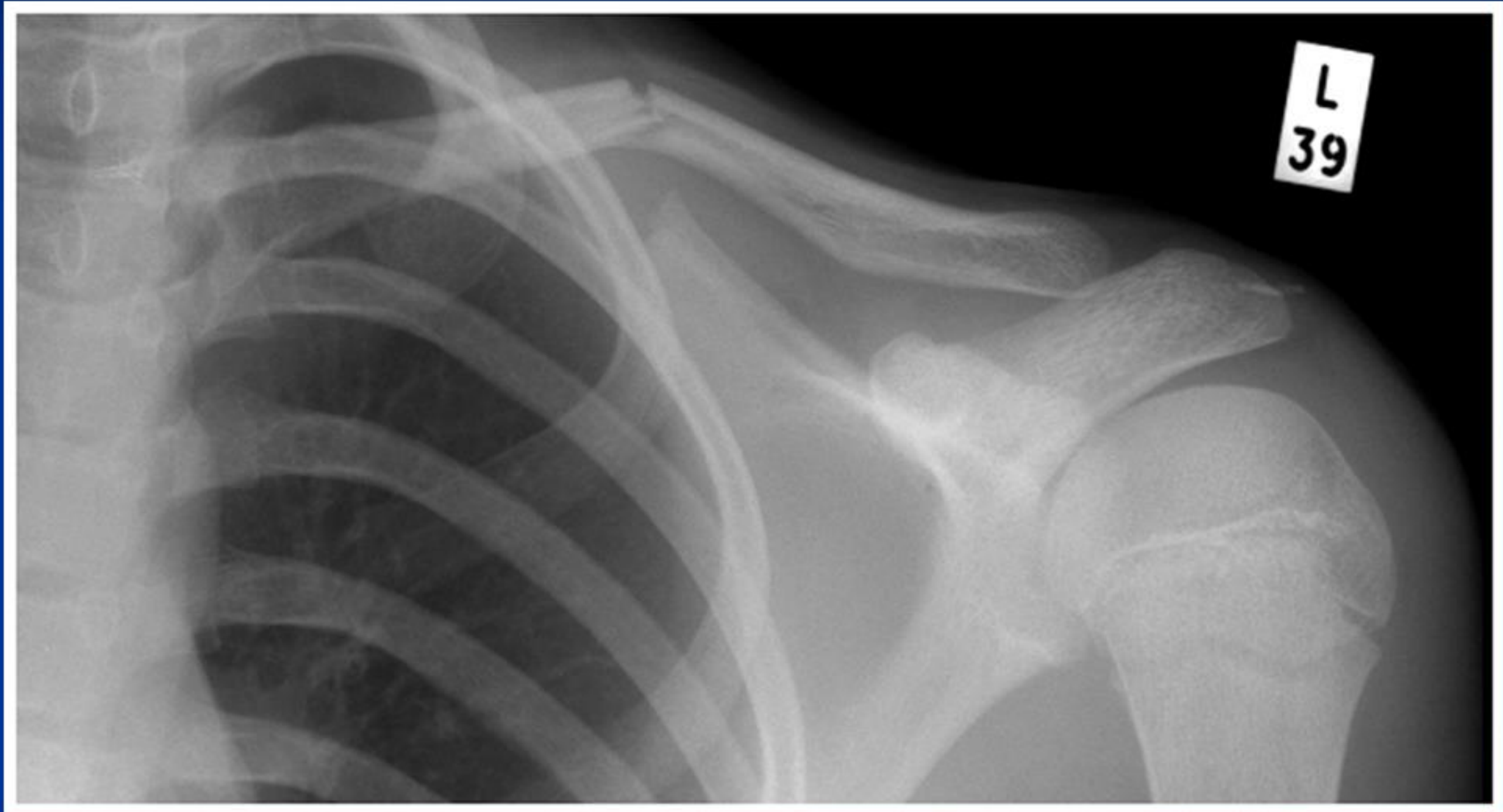
"Pulled (Nursemaid's) Elbow"

- Very common in children under 4 (peak: ages 1–3)
- More in common in boys; more common on left side
- Sudden traction with elbow extended & forearm pronated



treatment

Fracture Clavicle





314x304 @ 6.8 kb

scaphoid fracture



Figure: MaryAlburyMeyers

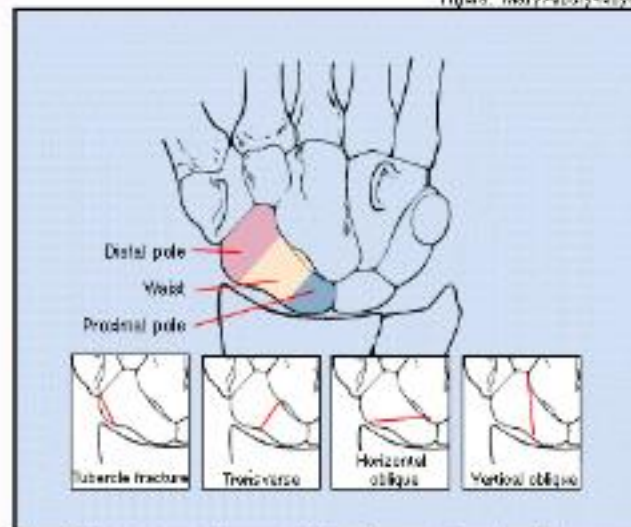


Figure 3. A dorsal view of the scaphoid bone demonstrates various fracture orientations. Determining the orientation on radiographs is important because the orientation helps guide treatment decisions.

waist .. most common site



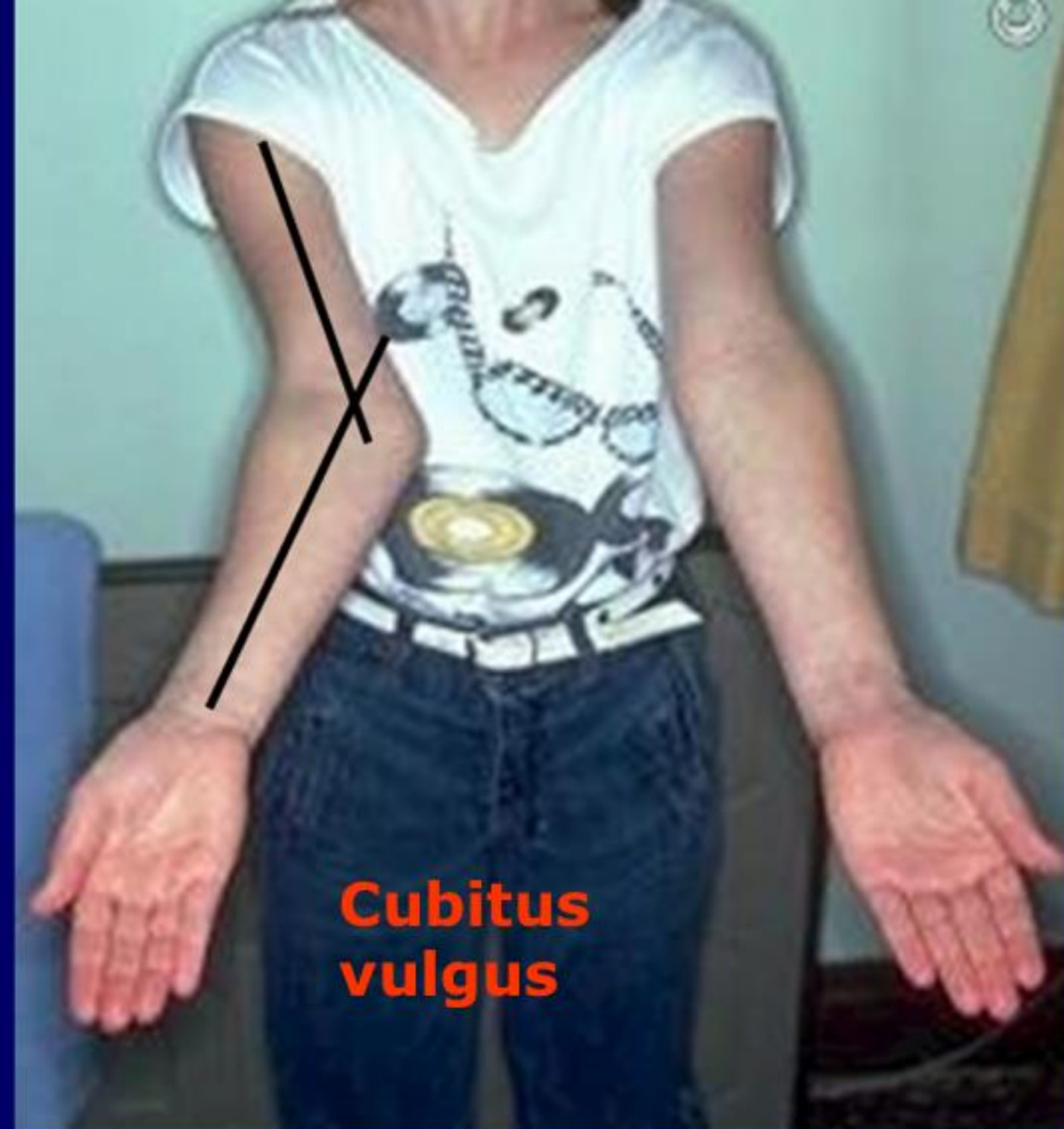
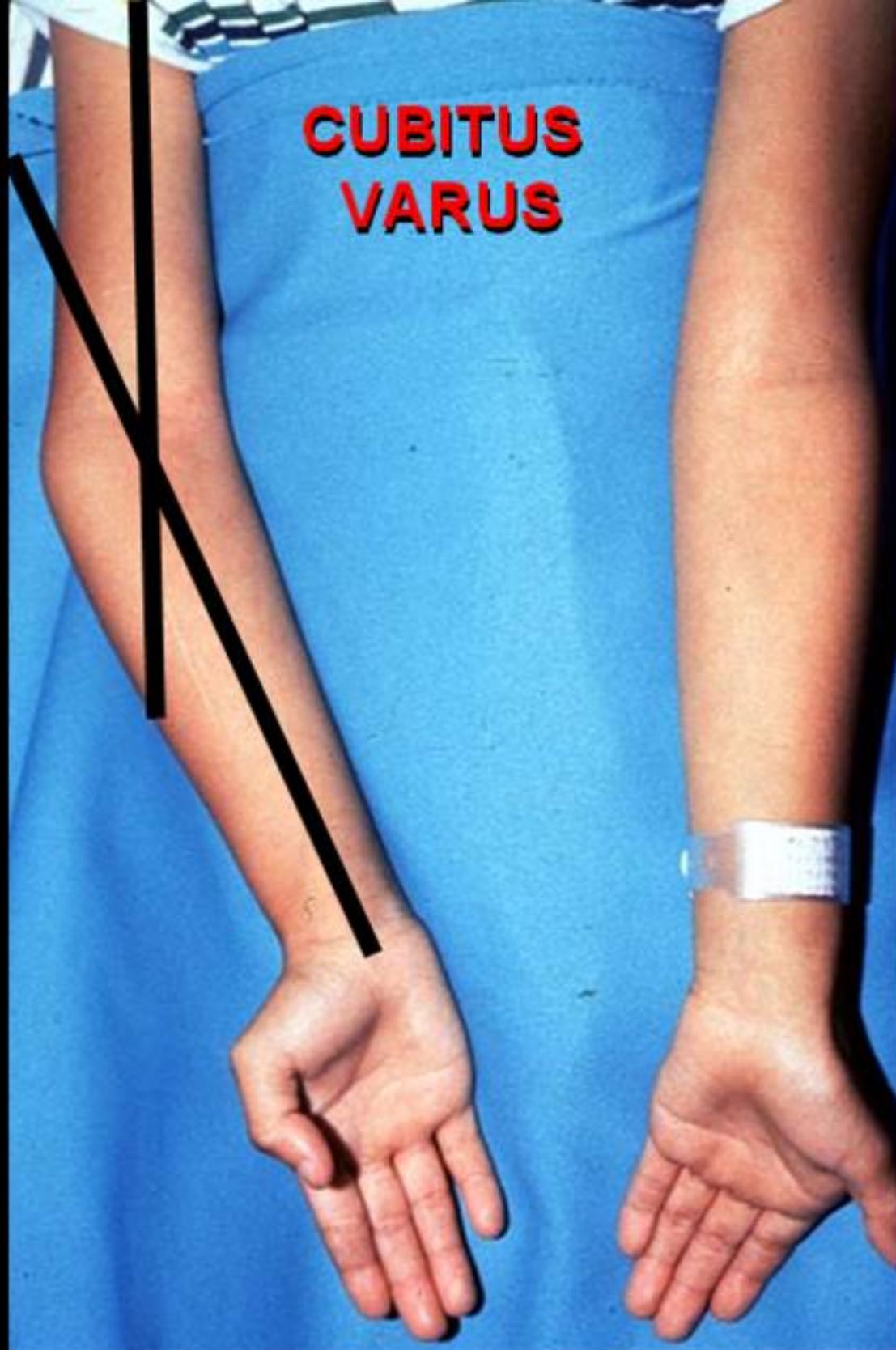
Monteggia Fracture



ANTERIOR SHOULDER DISLOCATION



- THE PATIENT HOLDS THE LIMB PREVENTING ANY MOVEMENT



MAL-UNION is THE MOST COMMON
COMPLICATION OF SUPRACONDYLAR
FRACTURE



RICHARD VON VOLKMANN

VOLKMAN'S ISCHEMIC CONTRACTURE

Mainly d.t
supracondylar
fracture



- **CONTRACTURE (FIBROSED SHORTENED FLEXORS).**
On wrist extension fingers will be in flexion.



Smith #

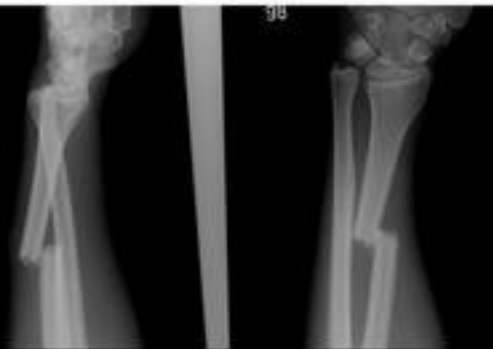
www.xray2000.co.uk



Anterior shoulder dislocation





















RONALDO LUIZ NAZARIO
M

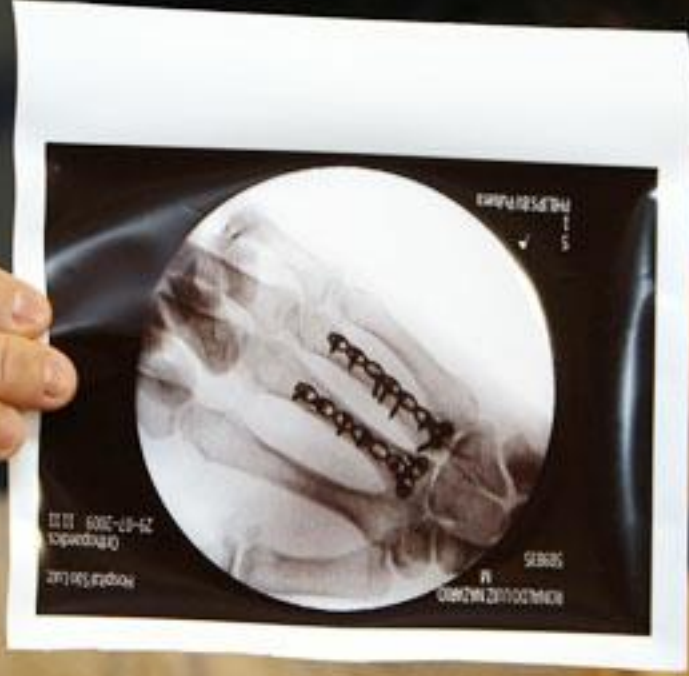
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Hospital São Luiz

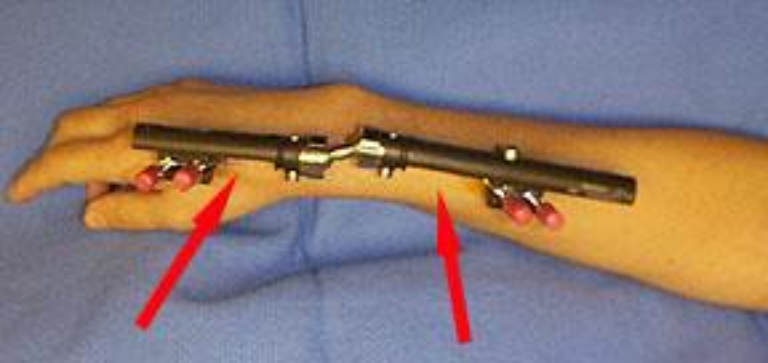
Orthopaedics
29-07-2009 11:11



5
1
PHILIPS BV Pulsera









DISLOCATIONS OF LOWER LIMB

HIP DISLOCATION

* Classification :-

- I Acquired dislocation :-**
- ① traumatic $\rightarrow$ (ant, post. & central). ↑
most common
 - ② Pathological $\rightarrow$ neoplastic, septic arthritis.
 - ③ post-paralytic $\rightarrow$ polio, cerebral palsy.
- II Congenital hip disl. :-** (DDH), "see deformity"

① Posterior disl. "most common"

*** Mechanism :-** severe force to knee with hip & knee flexed 90° + adducted hip.
(e.g. knee into dashboard in RTA)

*** Pathology :-** head of femur displaced superior & lateral posteriorly "toward ileum"

*** Clinical Picture :-** leg is shortened, adducted, flexed and internally rotated (CMR), tender. LOM

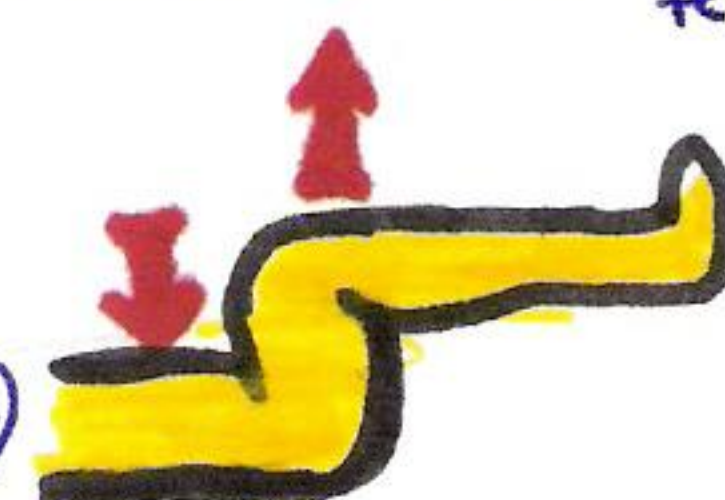
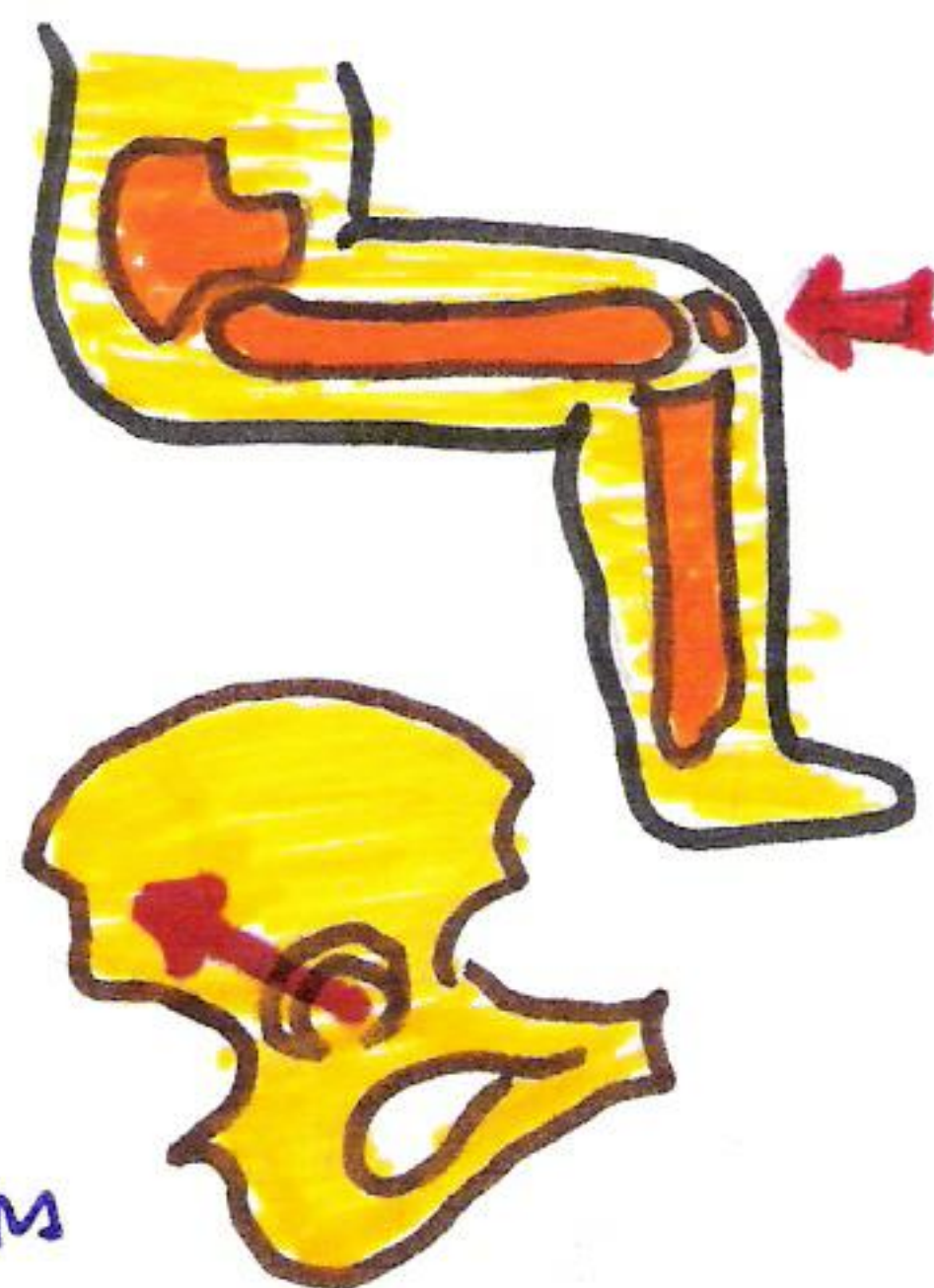
- no bruises or ecchymosis at hip $\rightarrow$ indirect trauma.
- no obvious swelling $\rightarrow$ hip joint is deep joint (bulky ms)

*** Diagnosis :-**

- $\rightarrow$ X-ray pelvis AP/Lat. $\rightarrow$ empty acetabulum, disl. head
- CT scan to exclude $\times$ HOF & acetabular rim. ^{shaft of femur}

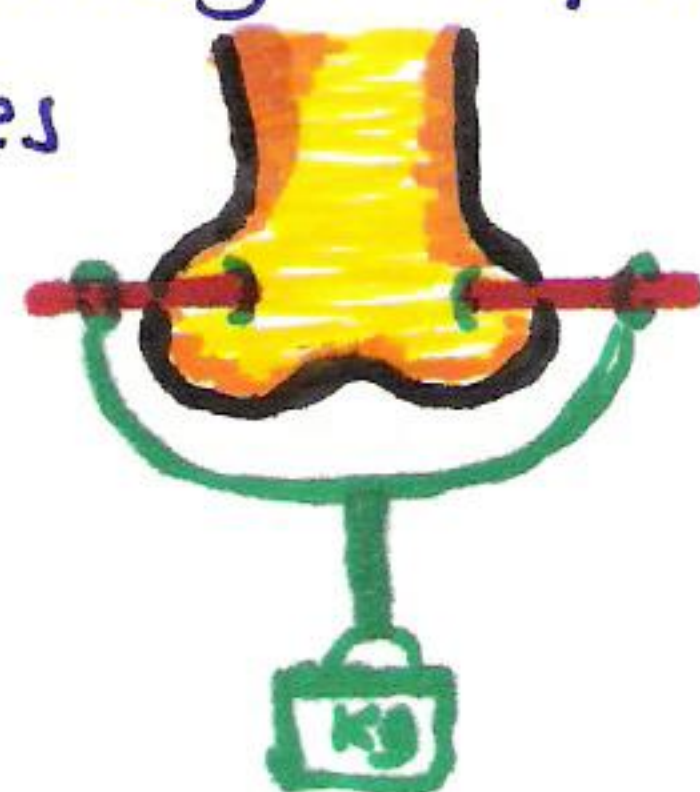
*** Treatment :-** ① closed reduction :- under GA

- pt supine with hip & knee flexed 90°
- Surgeon pulls upward with LR (lat. rotat) of the femur / while an assistant grasps the pelvis through iliac crest.



② Immobilisation :- by skeletal traction through a pin applied through femoral condyles with Wt for 3-6 wk

③ Rehabilitation :- active exercise.
- gradual Wt bearing by using the crutches.



*Complication:- I- early complication:-

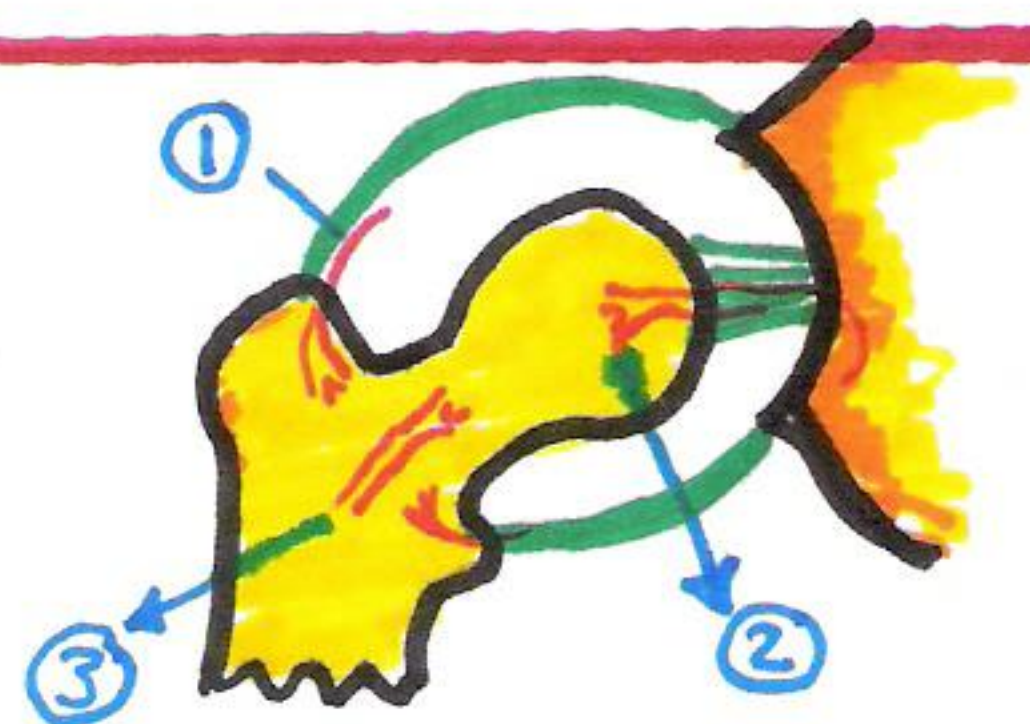
- ① Nerve injury $\rightarrow$ sciatic $\rightarrow$ foot drop. [in 25%] 10% Permanent
- ② Vascular " $\rightarrow$ superior gluteal artery.
- ③ associated * $\rightarrow$ acetabulum (post rim), head of femur, shaft of femur [Not neck]

II- Late complication :-

- ① myositis ossificans. (avoided by gentle manipulation. NSAID & ionized radiation $\downarrow$ Ca²⁺ no treatable)
- ② post traumatic osteoarthritis
- ③ stiffness.
- ④ avascular necrosis (AVN) of HOF :- appear on x-ray as $\uparrow$ density (early), later destruction & fragmentation - treated by hemiarthroplasty.

N.B:- head of femur supplied by -

- ① capsular B.V $\rightarrow$ main in adult.
- ② artery of HOF in ligamentum teres $\rightarrow$ main in infant
- ③ metaphyseal B.V.



② Anterior disLocation

*Mechanism :- blow to knee with hip widely abducted., or forcible abduction & lateral rotation (LR)

*Pathology :- HOF (head of femur) displaced ant (toward obturator foramen)

*Clinical Picture :- leg is lengthened (or normal), abducted and laterally rotated.
(shortening prevented by rectus femoris tendon)



- absolute LOM, HOF may palpable in groin or visible

* Treatment :- ① closed reduction :- under GA.

- apply traction of flexed limb with MR

② immobilisation :- skeletal traction (3-6 wk)

* Diagnosis :- x-ray AP/Lat (AP may look normal so do Lat view)

* Complication :- ① avascular necrosis.

② obturator N & vessel injury.

③ femoral N. & vessel injury.

④ osteoarthritis, stiffness.

③ Central hip disL.

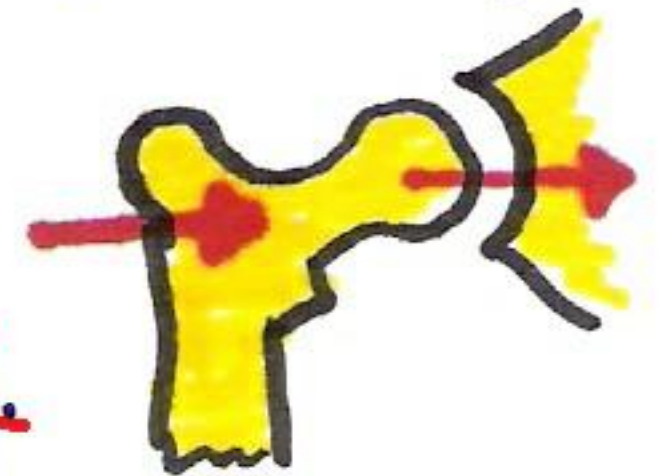
* Mechanism :- trauma to greater trochanter (direct)

* Pathology :- HOF is displaced centrally toward pelvic (medially)

* C/Picture :- leg in neutral position (no MR or LR)

slight abduction ± shortening.

- marked bruises, ecchymosis on Gr. ~~tuberosity~~ ^{Trochanter}

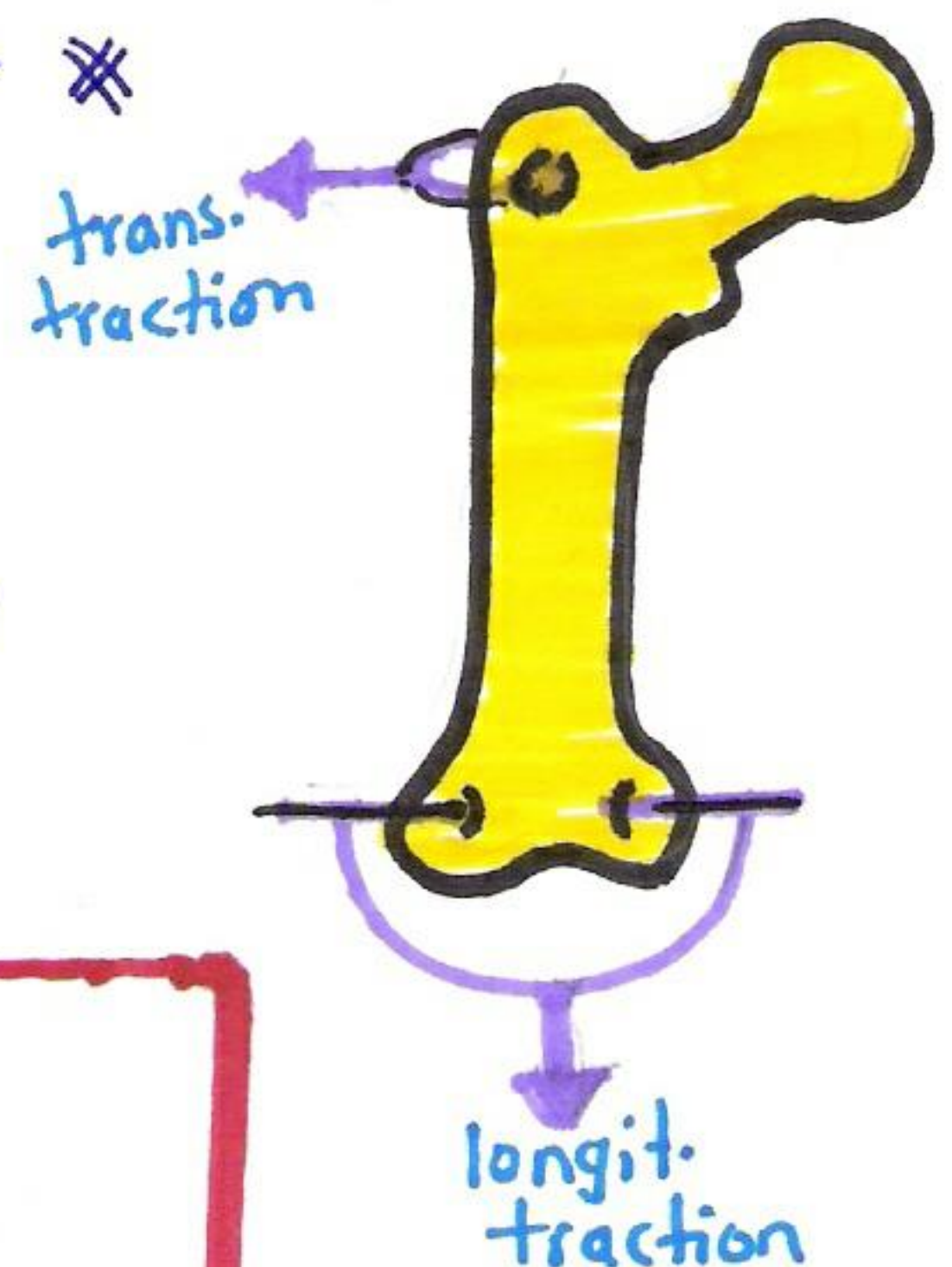


* Treatment :- Reduction & immobilization by : traction [gradual transverse & longitudinal skeletal traction]

- total hip replacement if acetabular *

* Complications : I - early :- visceral injury by HOF e.g. Bladder

II - late :- stiffness, myositis ossificans, osteoarthritis, AVN



* NOF :- shortening + LR + abduction.

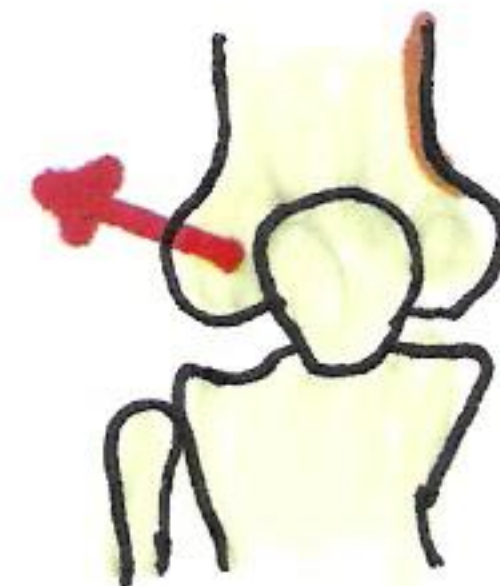
Post. Dis :- shortening + MR + adduction + Flexion

Ant. Dis :- lengthening + LR + abduction.

Central Dis :- shortening + Neutral position + abduction

PATELLAR DISLOCATION

- * Types :-
- ① Traumatic (acute) dislocation
 - ② recurrent disl.
 - ③ habitual disl.



- * Risk factors :-
- | | |
|------------------------|--------------------------------------|
| ① young, female | ④ high-riding Patella (Patella alta) |
| ② obesity, genu valgus | ⑤ shallow intercondylar groove |
| ③ weak vastus medialis | ⑥ tight lateral retinaculum. |

Toronto N.

① Traumatic (acute) disl.

* Mechanism :- sudden severe contraction of quadriceps muscle against a flexed knee.

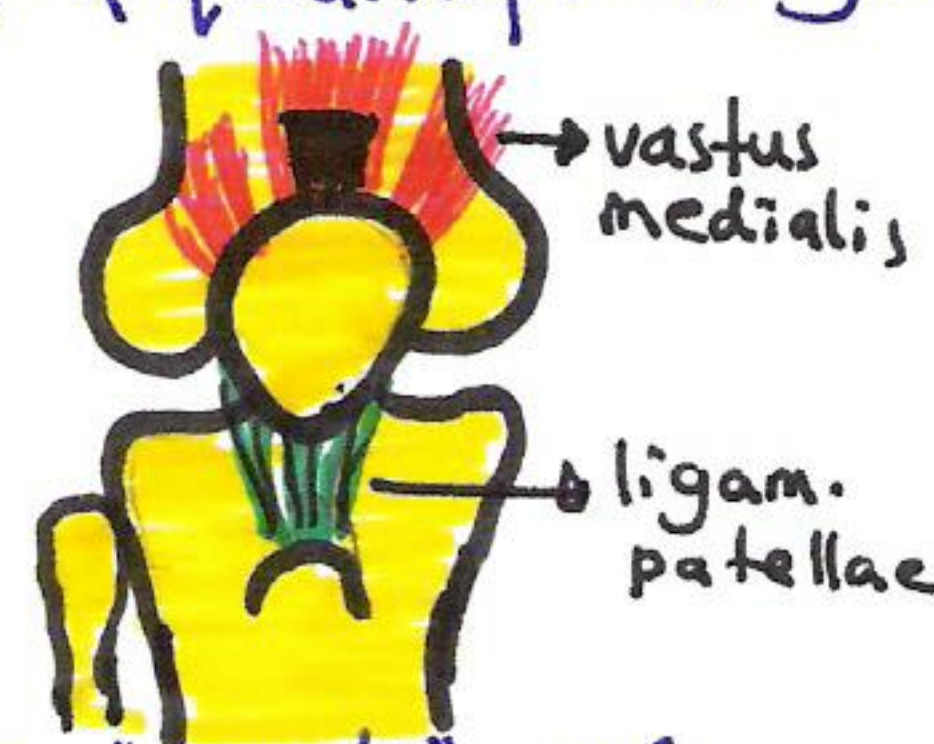
* Pathology :- dislocation always lateral. due to trauma.

* C/Picture :- knee gives way with walking, unable to straighten it.
- severe pain, tenderness, swelling, limited extension of knee

* Diagnosis :- x-ray AP-lat, skyline view of patella.

+ve patellar apprehension test. (apprehension on lat displace patella)

* Treatment :- reduction (closed) & immobilisation in cast (4-6 wk)
with rehabilitation (progressive wt bearing & quadriceps strengthening)



② Recurrent disl.

* Mechanism :- as acute disl.

* Pathology :- usually caused by congenital factors "genetic" as high patella, genu valgus, underdeveloped femoral condyles

* Treatment :- surgical tightening of medial capsule and release of lateral retinaculum

"done also by transposition of ligamentum patellae to new insertion → medial & distal to original insertion in tibia"

③ Habitual disl.

* Mechanism:- lateral dislocation each time when knee is flexed to a certain degree.

- it occurs without significant pain & with each certain flexion unlike recurrent disl. in which pt may be normal for wks or months between attacks.

* Pathology:- usually there is abnormality in vastus lateralis of quadriceps (shortening due to fibrosis) → lateral dislocation by flexion.

* Treatment:- release (division) of tight ms "myotomy of the vastus lateralis".

KNEE DISLOCATION

V. rare.

* Mechanism:- high energy trauma to a hyperextended knee
- It is very rare (knee is stable by lig, capsule, ^{quadriceps} ms)

* Pathology:- tibia displaced posteriorly, anteriorly, medial or lateral due to ruptured ligaments. (Post is most common)

* C/Picture:- knee instability, effusion, Pain
- always check vascular status (post. disl → vascular injury)

* Diagnosis:- clinical, x-ray → to exclude tibial fracture.

* treatment:- closed reduction, immobilisation in plaster & rehabilitation.

* Complications:-
① vascular injury (popliteal).
② osteoarthritis.
③ instability of knee.
④ associated fracture.

FRACTURES OF LOWER LIMB

HIP BONE *

* Mechanism :-

- pelvic * caused by high energy traum either direct e.g runover or indirect transmitted through femur.

* Clinical Picture :-

- local swelling, tenderness, deformity, pelvic instability.
- s/s of complication as hematuria (urethral or bladder injury).

* investigations :-

- X-ray AP/Lat.

* Classification :-

- A :- rotationally stable, vertically stable
- B :- rotationally unstable, vertically stable
- C :- rotationally unstable, vertically unstable.

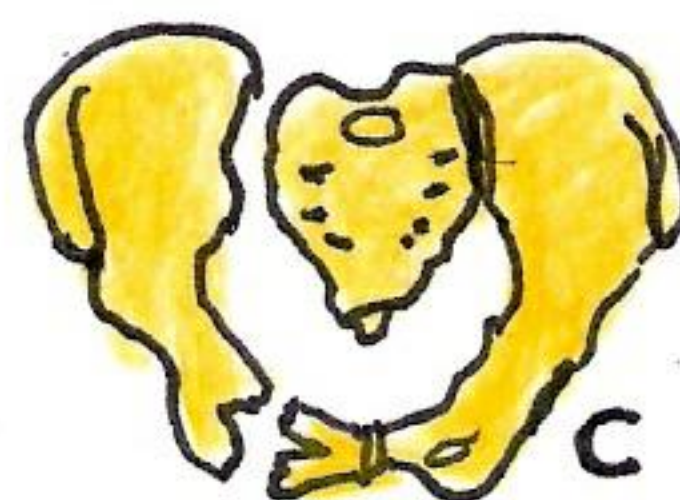
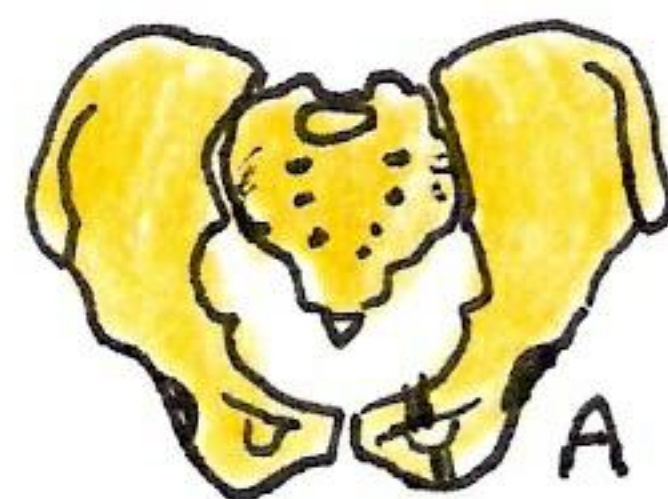
open book *

* Treatment :-

- assess genitourinary injury (if involved the * considered open)
- Type A → bedrest, mobilize with walking aids.
- Type B & C → external or internal fixation (also may treated by traction " canvas sling").

* complications :-

- 1- hemorrhagic shock
- 2- bladder/urethral injury (membranous part) & rectum
- 3- nerve injury.
- 4- arthritis (osteo),
- 5- Persistent sacroiliac joint pain.



FEMUR FRACTURE

Femoral Neck * (*NOF):

- Common in elderly (>60) more in female (Post menopause) due to osteoporosis. "pathological *"

*Mechanism :-

- Falldown on greater trochanter with lateral rotational force.
- typically occurs after slipping.

*Clinical Picture :-

- H/o falldown & pt cannot get up unaided. $\bar{e}$ sever pain, LOM
- o/e marked lateral rotation with abduction, short limb and LOM or even impossible to move (pain).

*Classifications :-

- Cooper's classification
 - extracapsular *NOF
 - intertrochantric.
 - Subtrochantric (just below Trochantr)
 - intracapsular *NOF

• the intracapsular *NOF is classified by :-

① Garden's classification :- (according to displacement)

G I :- incomplete * with no displacement.

G II :- complete " " no " "

G III :- complete " " minimal " "

G IV :- complete " " severe " "

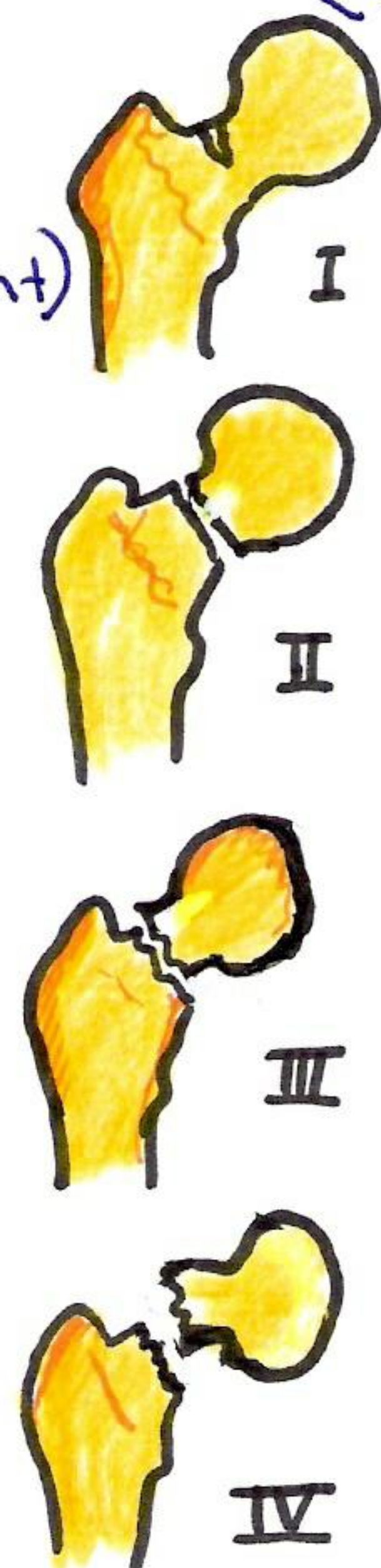
② Delbet classification :- (according to site) :-

1- subcapital.

2- transcervical.

3- basal *.

NB:- Capsule of hip joint is attached anteriorly to intertrochantric line and posteriorly to base of the neck.



* Treatment of *NOF :-

1- Grade I & II :- internal fixation by DHS (dynamic hip screw)

2- G III & IV :- according to age :-

• If > 60 yr $\rightarrow$ hemiarthroplasty or ^{total hip replace} THR

• If < 60 yr $\rightarrow$ ORIF (open reduction & IF $\rightarrow$ DHS)

• hemiarthroplasty : if failed reduction or developed avascular necrosis



3- Extracapsular *NOF :- internal fixation by DHS.

* Complications :-

(A) Intracapsular :- avascular necrosis, nonunion, osteoarthritis, ... etc

NB:- nonunion is mainly caused by fibrinolytic enzymes inside synovial fluid (prevent hematoma), but also by poor blood supply & impert reduction & IF

- nonunion is treated by hemiarthroplasty if > 50 yr (if $< 50 \rightarrow$ bone graft).

(B) Extracapsular :- malunion, deformity (coxa vara), DVT, ... etc also malrotation deformity & failure of fixation device.

Femoral Shaft *

* Mechanism :- sever violent (RTA), common in young adult.

- Pathological * in old by metastasis (commonst site is upper $1/2$)

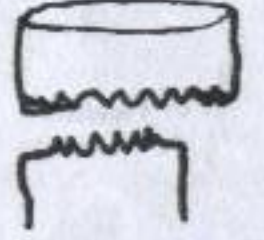
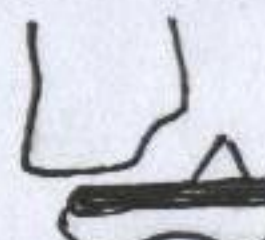
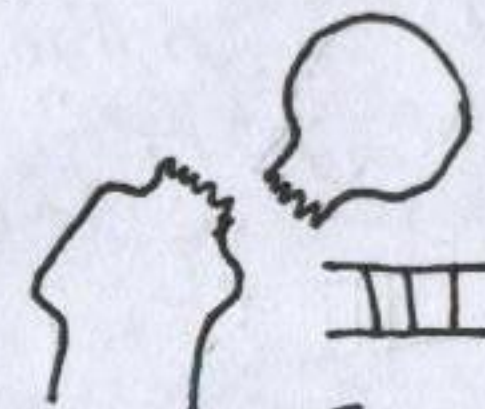
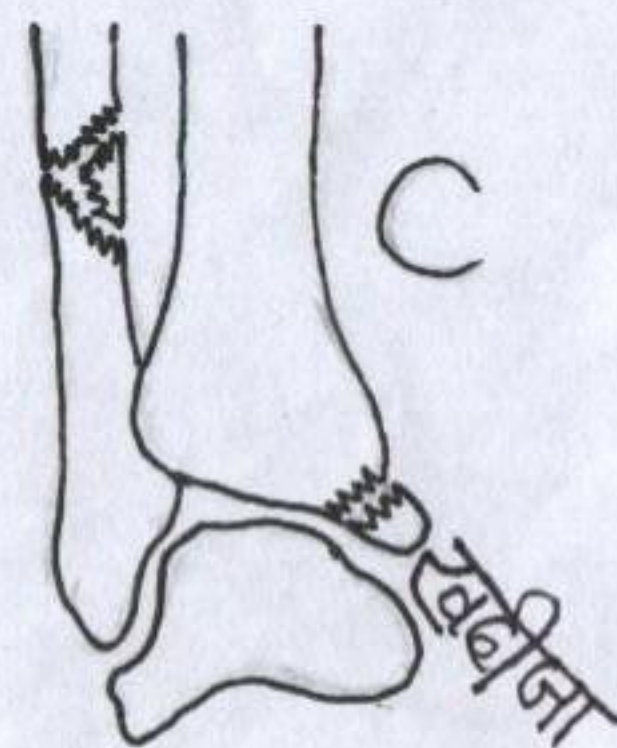
* C/Picture :- Pain, LOM, shock ($> 1L$ lost), ... etc.

- you must do $\rightarrow$ Knee examination, vascular assess, pelvis x-ray

* Treatment :- continuous traction + Thomas splint

- ORIF (Intramedullary nail or plate & screw) $\rightarrow$ see indication of IF ^{OR}

- external fixation if open * or pt with multiple injury

Veers Classification	Mason Classification	Salter Harris Classification	Garden's Classification	Weber Classification
 I no displacement MX arm sling  II ck # + displacement MX closed reduction  III ck # + displacement bone tuberosity # MX open reduction  IV ck # + displacement 2 tuberosity # MX prosthesis	 I undisplaced MX Rest in Arm sling  II displaced MX ORIF  III Comminuted MX excision head ± prosthesis  IV Comminuted + elbow dislocation MX as III	 I (Stable) Transverse through growth plate  II (above) Through metaphysis & growth plate.  III (low) through epiphysis to plate & along growth plate.  IV (through) through epiphysis & metaphysis.  V (Ram) Crush injury of growth plate	 I incomplete # ± No displacement MX: internal fixation by DHS  II Complete # ± No displacement MX: as Grade I  III Complete # ± Minimal displacement MX: if > 60° Hemiarthroplasty or Total Hip replacement if < 60° ORIF  IV Complete # ± marked displacement MX as III	 A (infra-syndesmotic)  B (Trans-syndesmotic)  C (Supra-syndesmotic)



Type 1



Type 2



317x341 @ 11.9 kb





640x407 @ 43.7 kb





Supracondylar * of femur :-

* Mechanism :-

- high energy trauma (RTA) in young adults & low energy trauma in old (osteoporosis).

* Pathology :-

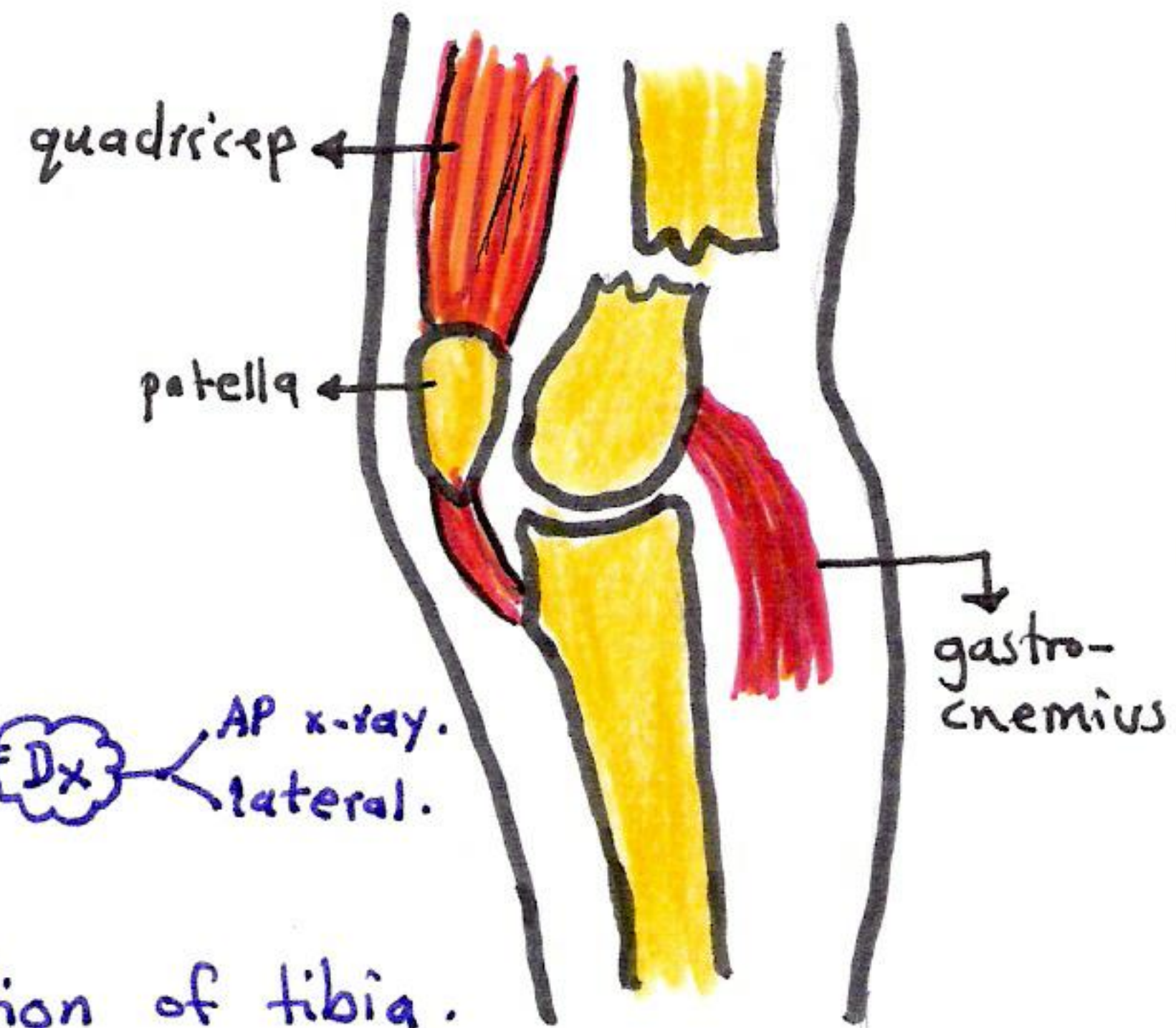
- The distal fragment is tilted anteriorly by quadriceps but may be posteriorly by gastrocnemius.

* Clinical Picture :-

- Pain, swelling, deformity & LOM

* Treatment :-

- Slight displacement $\rightarrow$ skeletal traction of tibia.
- Severe displacement $\rightarrow$ open reduction & int. fixation (ORIF).



Femoral condyles * :-

* Mechanism :- high energy trauma or axial loading through tibia.

* C/Picture :- extreme pain, knee effusion (hemarthrosis) $\rightarrow$ doughy sensation

* investigation :- X-ray $\rightarrow$ condylar * (one condyle * , displaced upward) 
 $\rightarrow$ intercondylar (two condyles * & split apart) 

* Treatment :- ORIF & early mobilization & strengthening

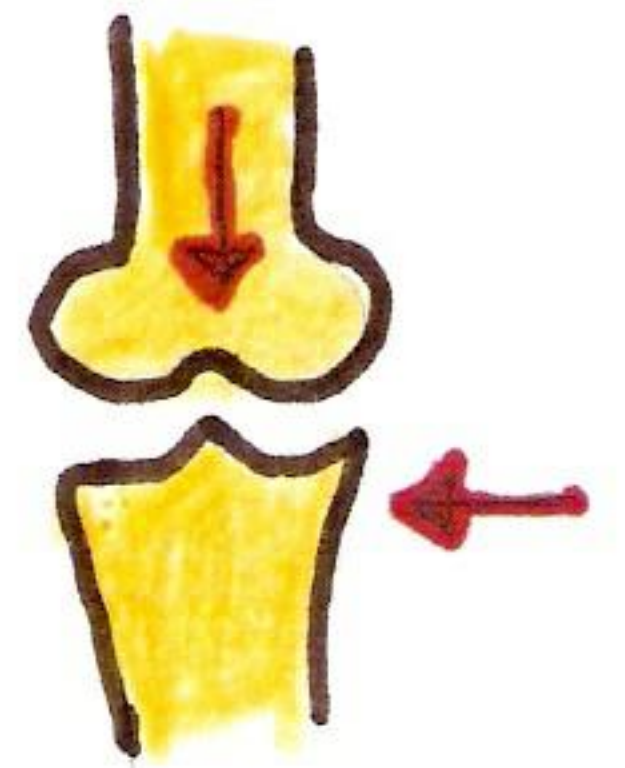
- hemarthrosis must be aspirated first (as soon as possible).

TIBIAL FRACTURE

Tibial Plateau * "Tibial condyle *"

* Mechanism :-

- femoral condyles driven into proximal tibia, ie strong bending force accompanied with axial force (bumper *)



* Clinical Picture :-

- Tenderness, hemarthrosis, NB: lateral * > Medial

* Treatment :-

Medial * > danger than lateral → b/c comminuted

- Medial condyle * → ORIF. (comminuted)
- Lateral condyle * → Undisplaced ^{or minimal} → conservative (aspirate hemarthrosis + plaster)
- displaced markedly or comminuted → ORIF (± bone graft)
- Bicondylar * → ORIF (may be combined with external fixation)

Tibial shaft *

* Mechanism :-

- numerous, including high energy (RTA), falls, sporting injuries
- (most common open *)

* Clinical picture :-

- Pain, swelling, --- etc, "
- s/s of complication :- Compartment syndrome (high incidence), nerve & vessel inj.

* Treatment :-

- closed * → undisplaced → straight leg cast (4-6 wk), displaced ORIF ^{IM nail}
- open * → resuscitation (ABC), cleaning, external fixation, --- etc.

* Complications :-

- neurovascular injury & compartment syndrome have high incidence
- non/mal union. <sup>→ [tibial N & vessel
common peroneal N.]</sup>
- osteomyelitis.
- associated * of fibula.

[illegible]

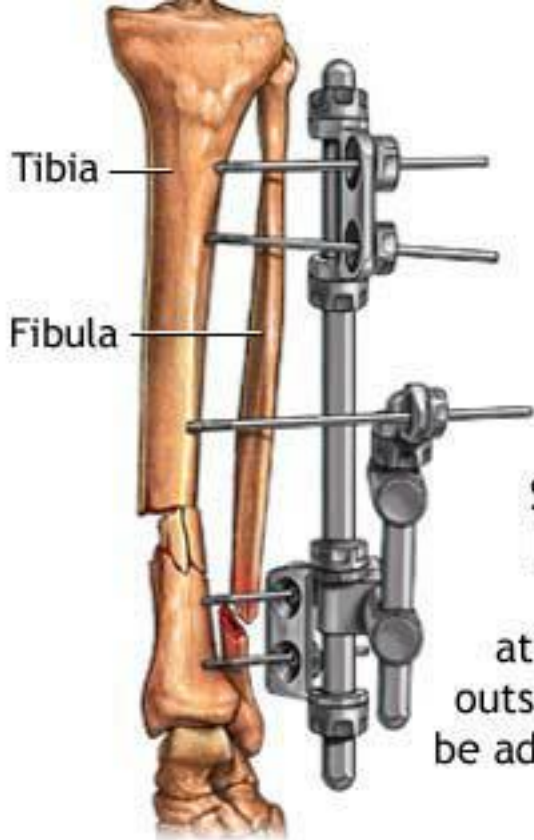
Sample Use Only - Copy



25x432 @ 24.9 |



240x300 @ 7.9 kt



External
fixation

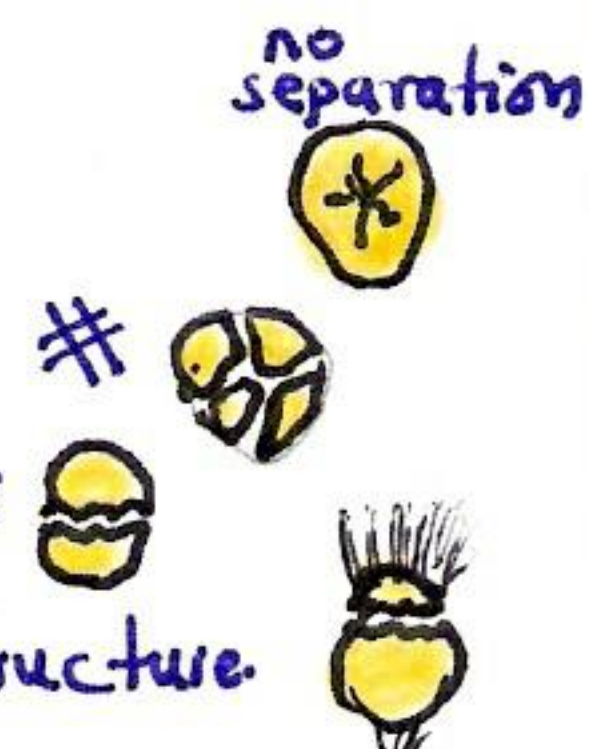


Screws are placed into the bone above and below the fracture, and a device is attached to the screws from outside the skin, where it may be adjusted to realign the bone



PATELLAR FRACTURE

* Mechanism :-

- 1 - Direct trauma → fall or blow on knee → Stellate *
→ comminuted #
 - 2 - Indirect trauma → by ~~extension~~ ^{strong contraction} of quadriceps → transvers *
→ avulsion fracture
- 

* Clinical Picture :-

- C/O: Painful swelling
- O/E: marked tenderness, ^{flexion possible} extension lost, effusion (hemarthrosis)

* Treatment :-

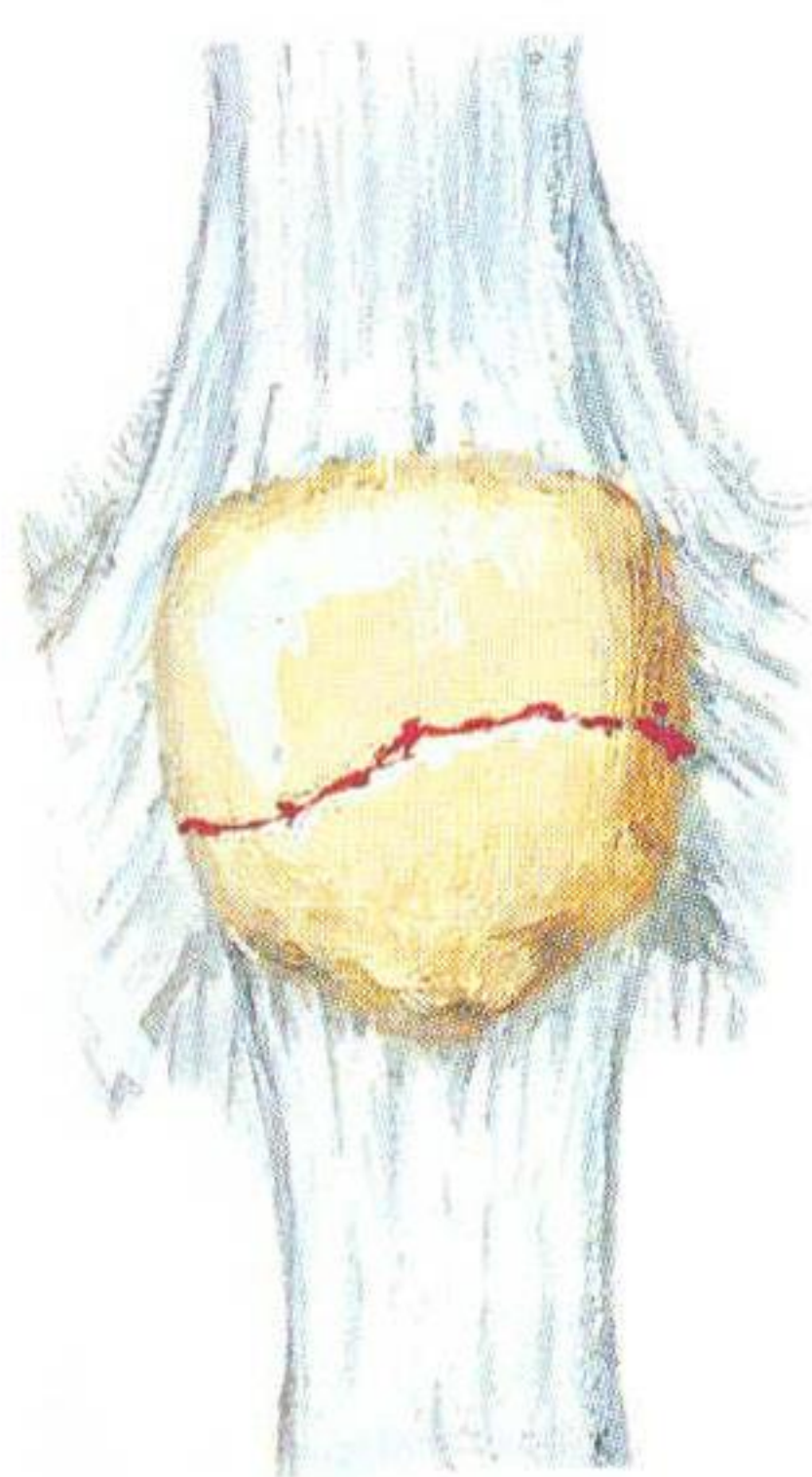
- stellate (no displacement) → immobilization in plaster (6-8 wk) ^{from groin to malleoli}
- Comminuted * → patellectomy (excision of patella & repair quadriceps)
- Transverse * → ORIF (by a screw driven vertically upward) + plaster 8 wk
• if pt > 45 yr do patellectomy
- avulsion * → excision of fragment & tendon is repaired.

* Complications :-

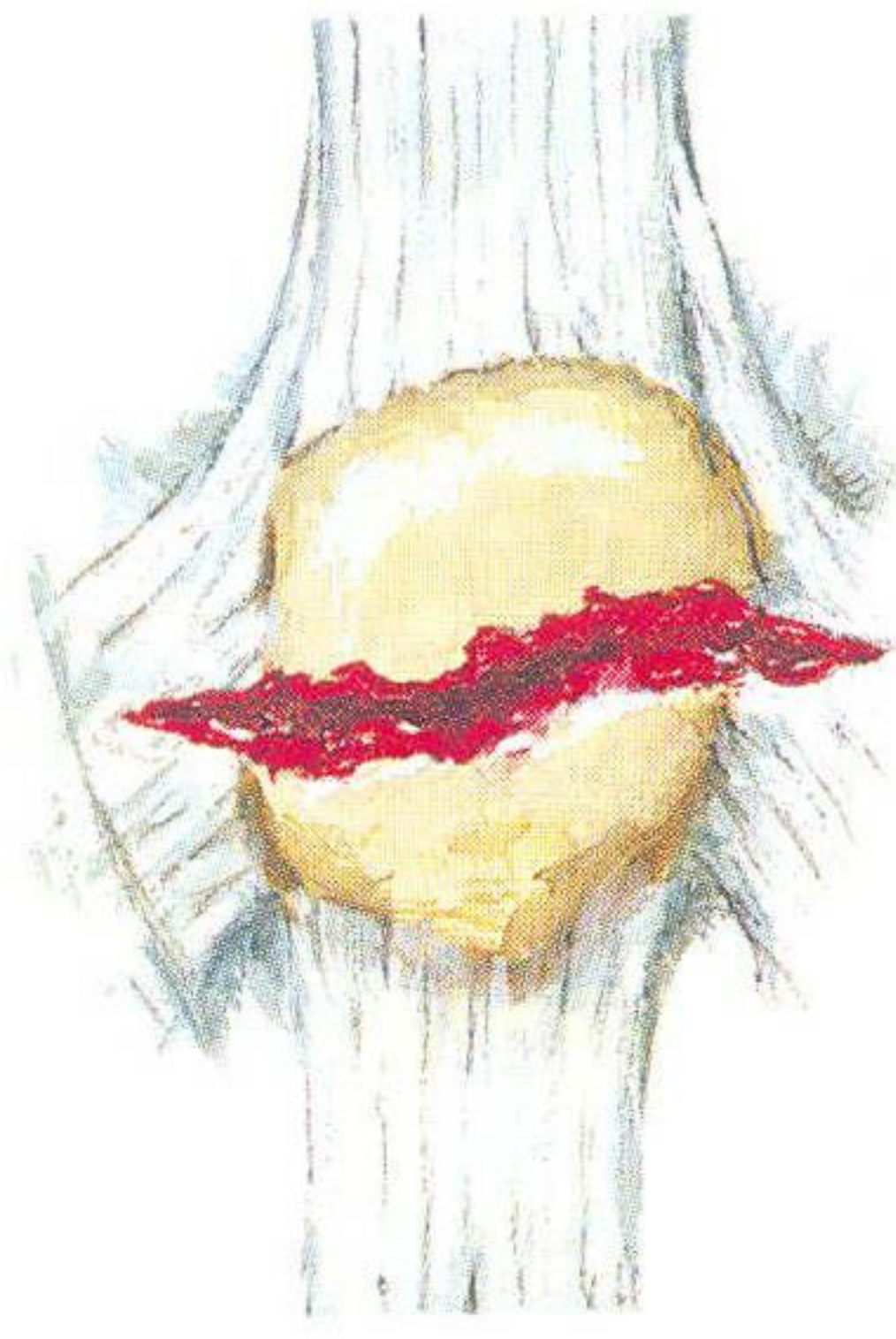
- 1 - Osteoarthritis
- 2 - Non-union.
- 3 - Stiffness of knee.

NB:- effect of Patellectomy :-
Power of full extension is slightly impaired especially on climbing or descending ladders or stairs.

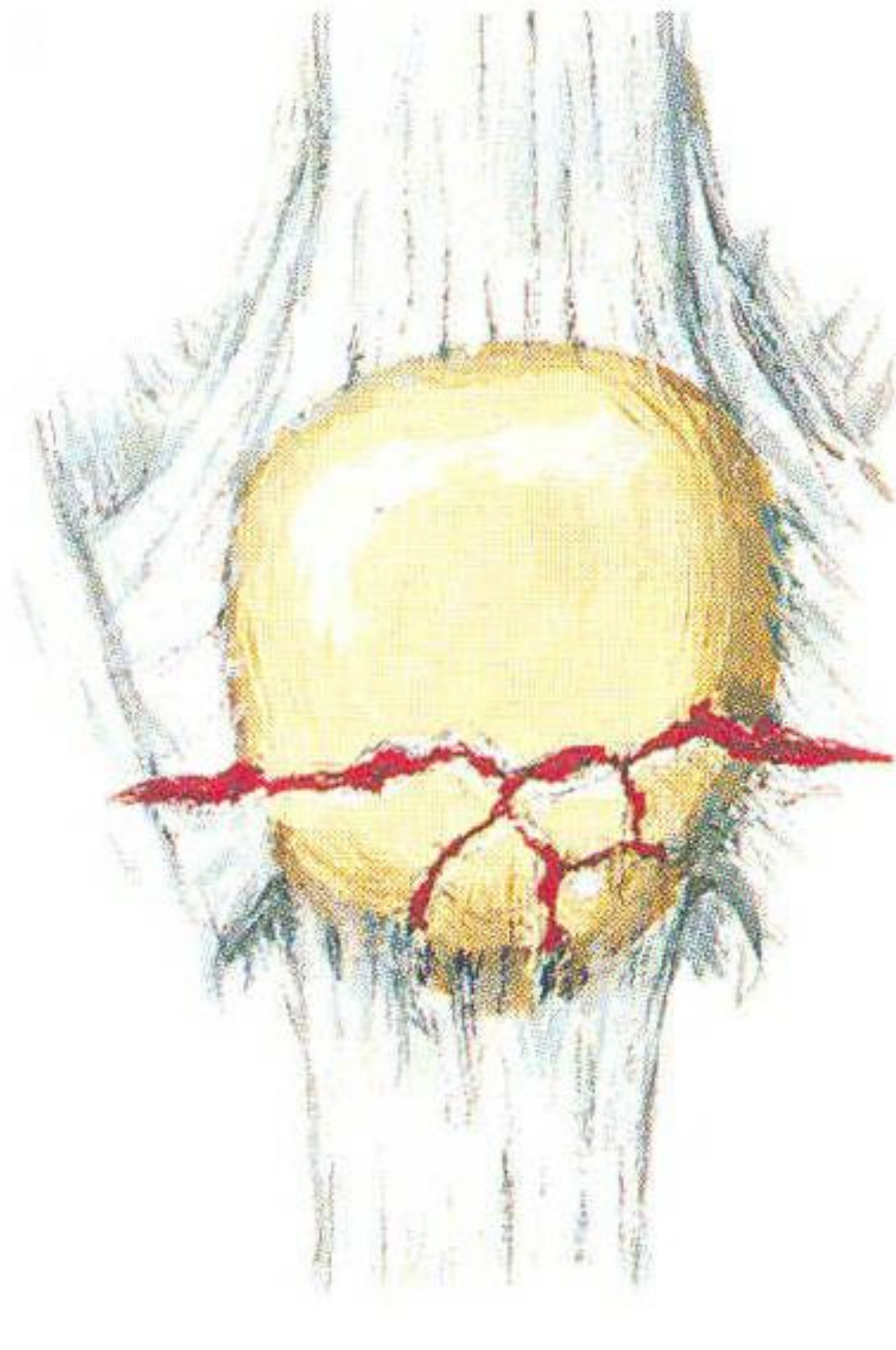
Fractures of Patella



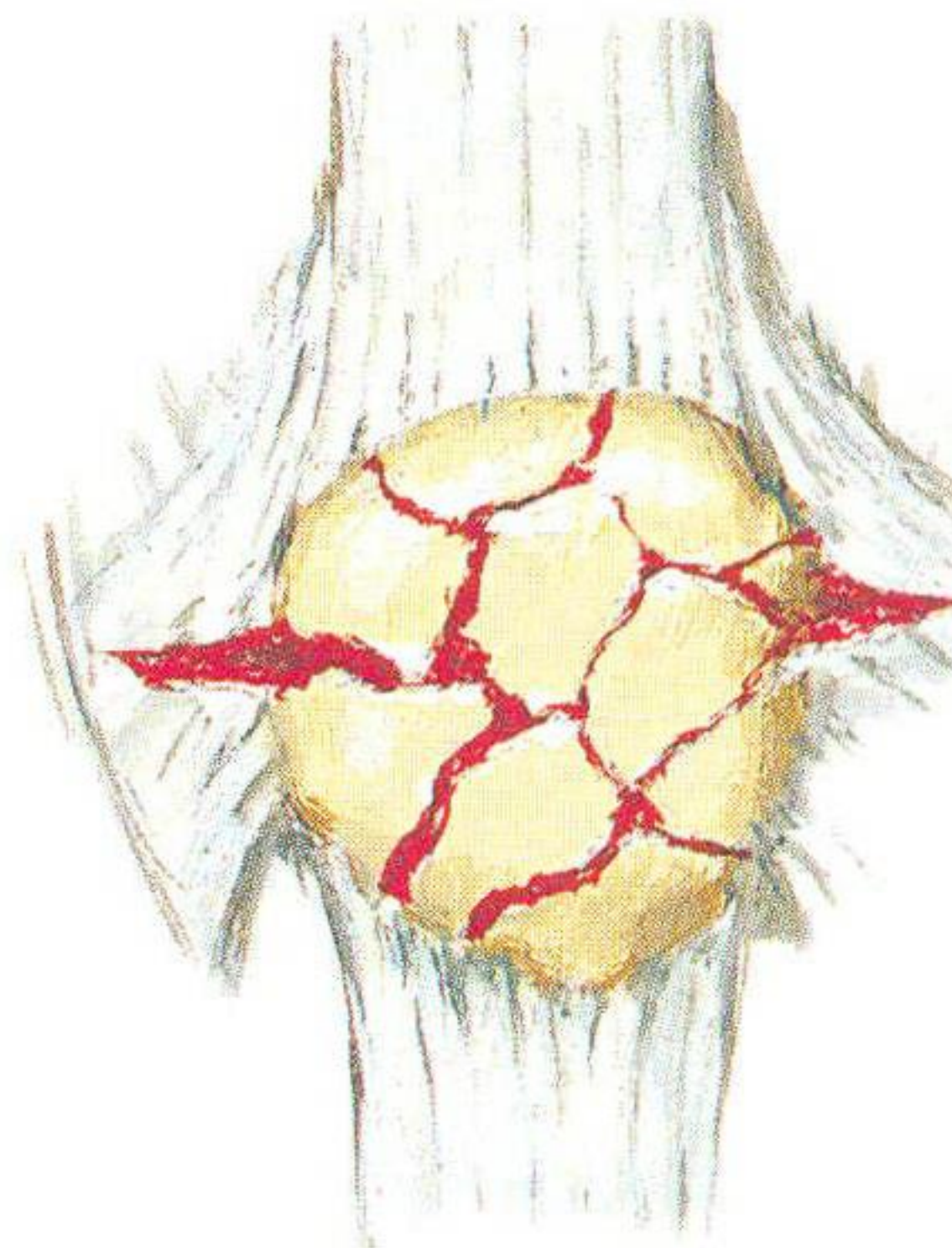
Nondisplaced transverse fracture with intact retinaculum



Displaced transverse fracture with tears in retinaculum



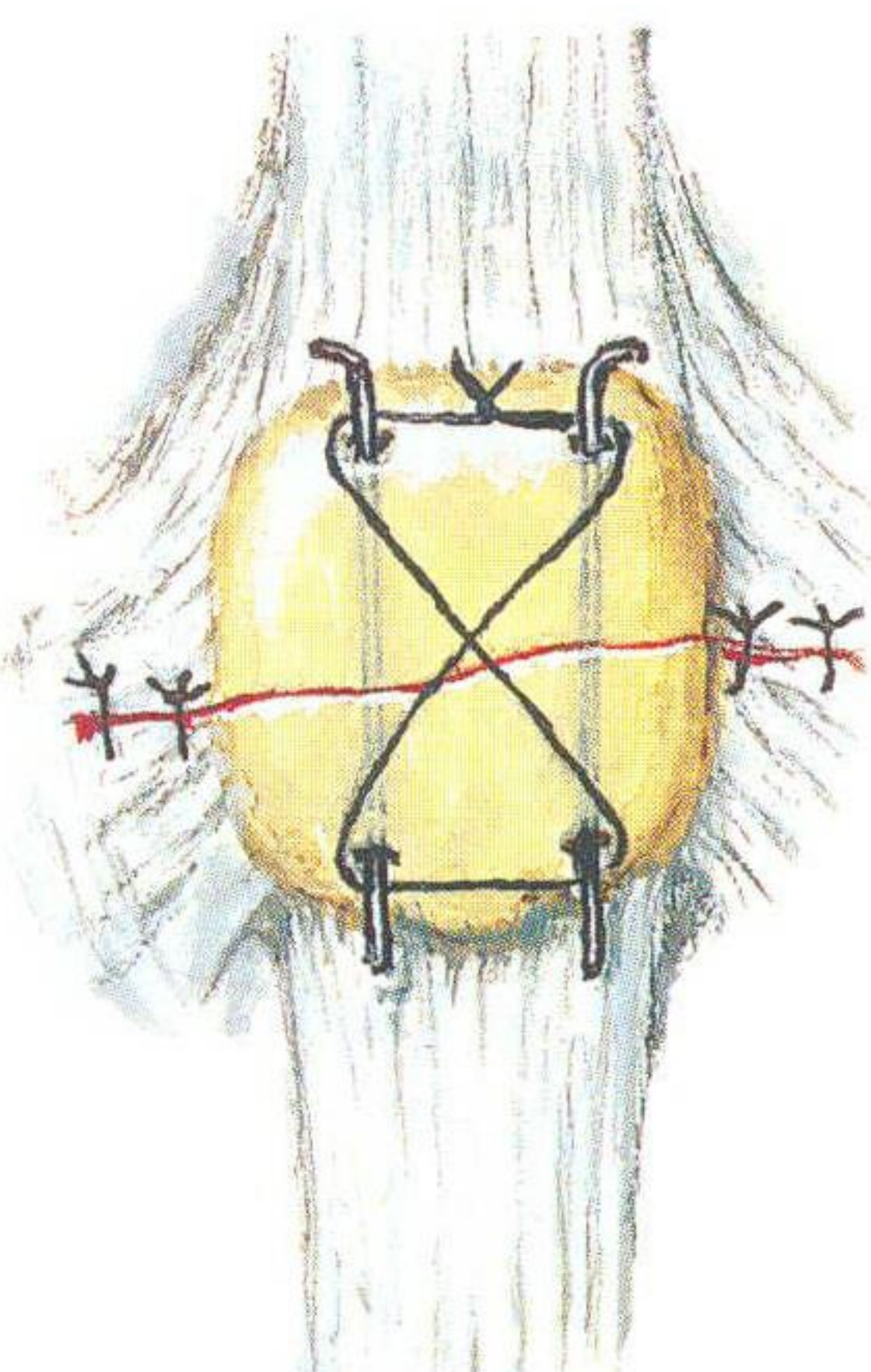
Transverse fracture with comminution of distal pole



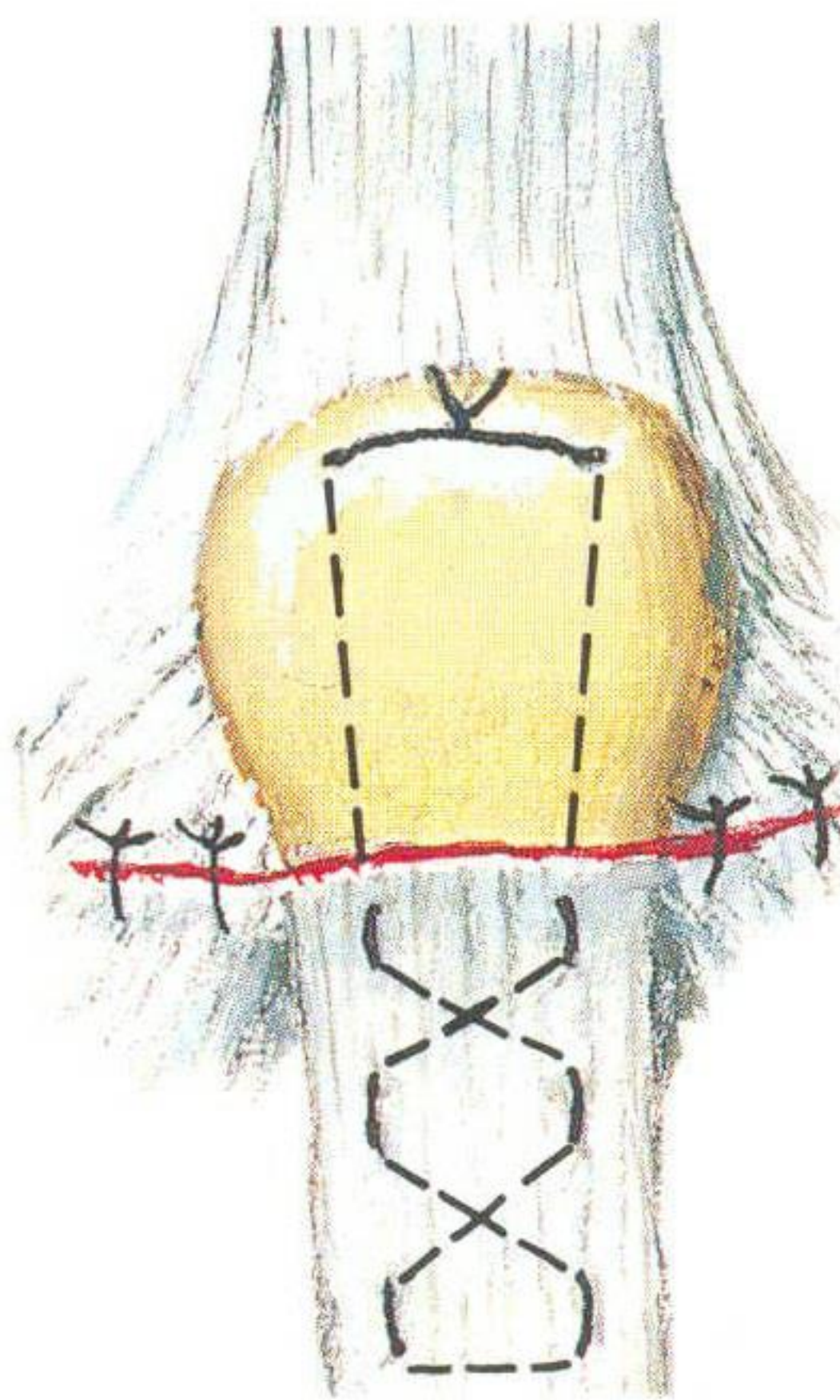
Severely comminuted fracture



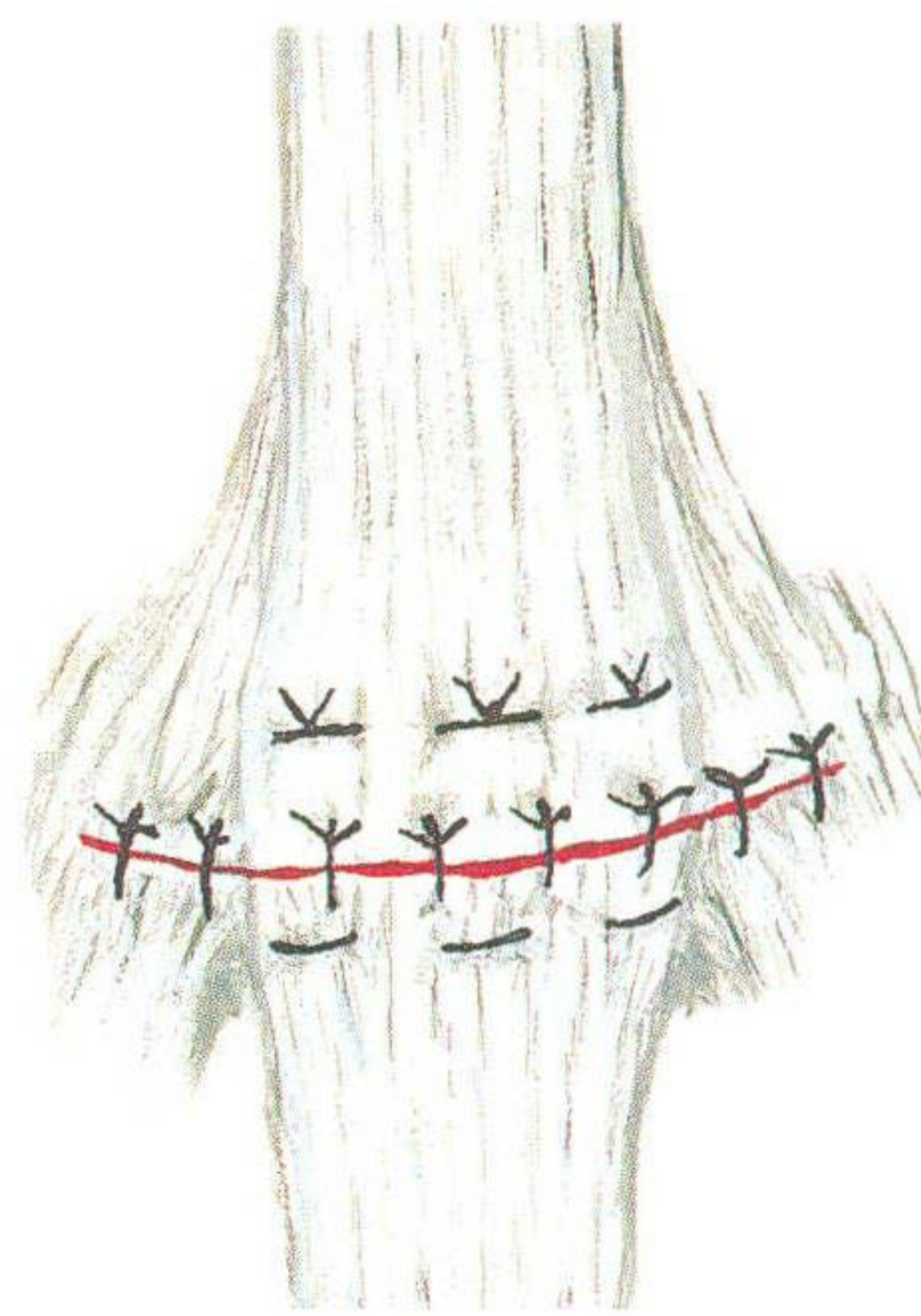
Treated with long leg cast for 4–6 weeks followed by passive and active range-of-motion exercises



Repaired with pins through vertical drill holes and figure-of-8 tension band wire and suture of retinaculum



Lower poles excised completely, and patellar ligament reattached to remainder of patella with wire through drill holes. Retinaculum repaired



Patella removed, quadriceps femoris tendon sutured to patellar ligament with nonabsorbable sutures. Retinaculum repaired

ANKLE FRACTURE

(Pott's ✖)

* Mechanism :-

① Abduction & or lateral rotation (commonst):-

- 1- Lateral malleolus (or distal end of fibula) shear-off.
- 2- Medial malleolus ✖ (transverse avulsion).
- 3- Medial collateral lig. (deltoid lig) strain.

② Adduction force & or MR :-

- 1- Medial malleolus shear-off.
- 2- Lateral collateral lig strain.
- 3- Fibular fracture.

③ Vertical (axial) compression force :-

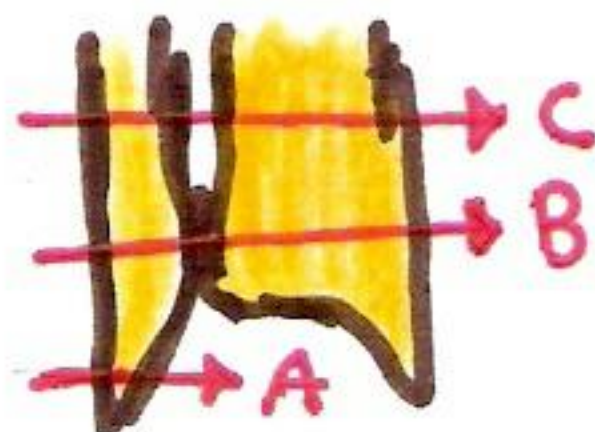
- 1- One malleolus may fractured (First degree).
- 2- Two malleoli " " (second ").
- 3- Two malleoli ✖ with posterior tip of tibial articular surface (posterior malleolus) → (Third degree)



* Classification :-

"Weber (Danis-Weber) classification" :-

- Type A :- (infra-syndesmotic) :- ✖ below level of syndesmosis.
 - pure inversion injury.
- Type B :- (trans-syndesmotic) :- ✖ at level of syndesmosis.
 - eversion & external rotation (commonst).
- Type C :- (supra-syndesmotic) :- ✖ above level of syndesmosis.
 - external rotational injury.



* Diagnosis :- (rule of Ottawa in x-ray) :-

- X-ray only required if :-
- ① Pain at malleoli & tenderness on them.
 - ② inability to Wt bear after injury.

- X-ray AP/lat, mortise view

↳ (ankle at 15° MR → true view of ankle & joint space)

- CT scan may required

Toronto notes

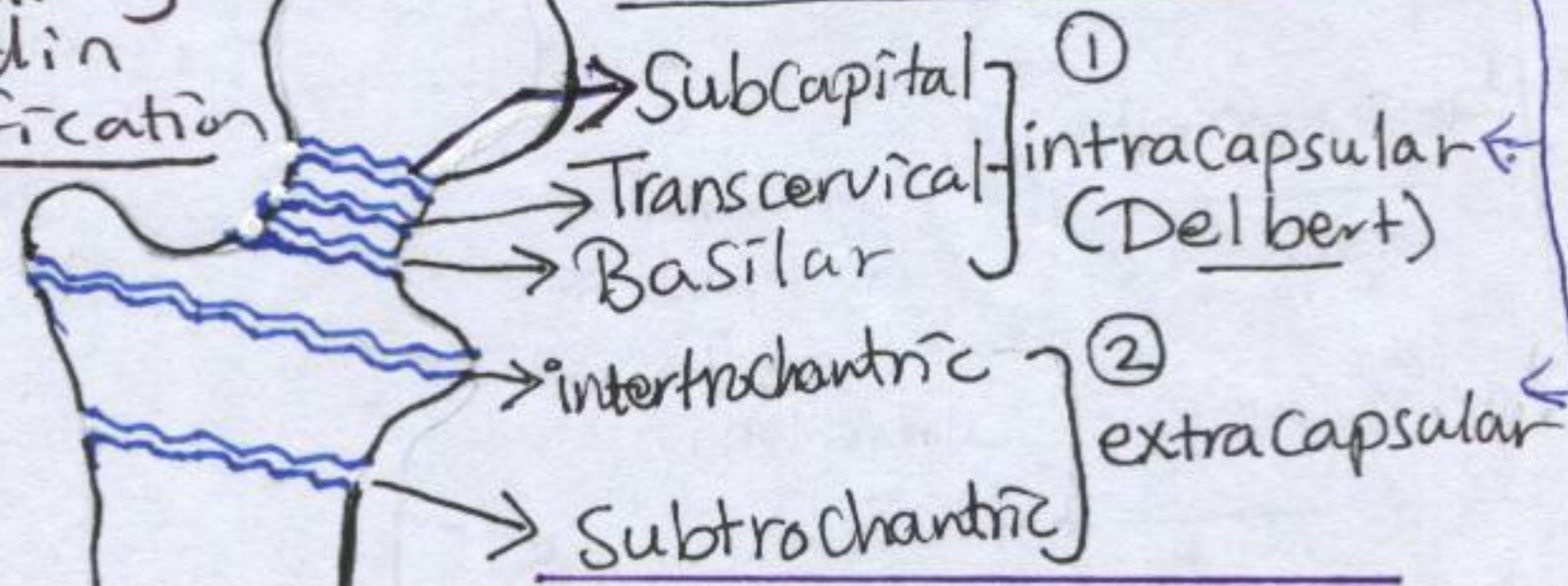
Toronto

I & II) Internal fixation by DHS

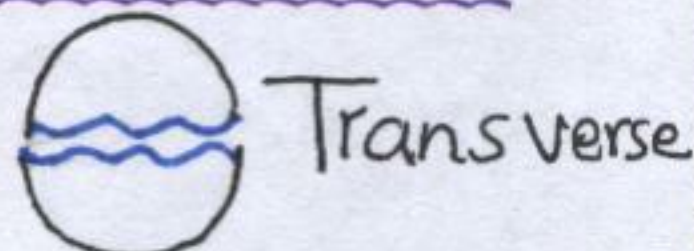
III, IV)
 - > 60y Hemiarthroplasty
 or Total hip replacement
 - < 60y ORIF

MX according to Garden Classification

#NOF (Cooper's)



#Platella



Transverse

mx: ORIF



Stellate

mx: immobilization in plaster (6-8wk)



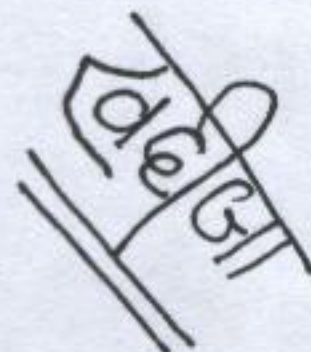
Comminuted

mx: patellectomy



Avulsion

mx: Reinsertion



ant (extension)

Supracondylar #

mx: Traction & ORIF.

2 ←

2 ↓

1 ↑

femoral condylar # → mx ORIF

Lat common than Medial

Med Comminuted

Tibial Platen (Bambard) mx: ORIF.

shaft Tibia

mx: resuscitation (ABC) > Cleaning > external fixation.

Syndesmosis

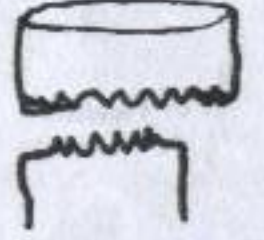
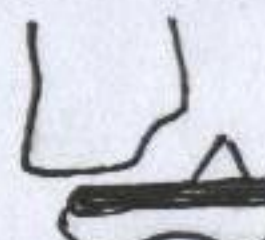
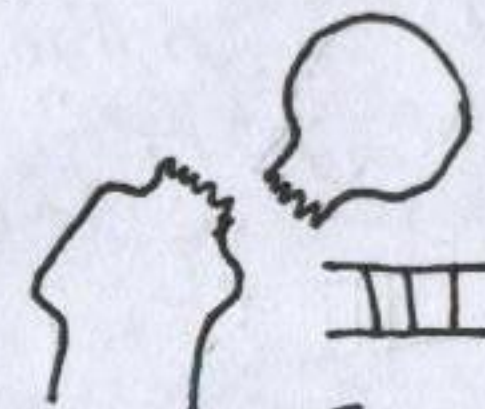
C → ORIF

B

A

undisplaced → Plaster
 displaced → ORIF

Weber (ankle #)

Veers Classification	Mason Classification	Salter Harris Classification	Garden's Classification	Weber Classification
 I no displacement MX arm sling  II ck # + displacement MX closed reduction  III ck # + displacement tuberosity # MX open reduction  IV ck # + displacement 2 tuberosity # MX prosthesis	 I undisplaced MX Rest in Arm sling  II displaced MX ORIF  III Comminuted MX excision head ± prosthesis  IV Comminuted + elbow dislocation MX as III	 I (Stable) Transverse through growth plate  II (above) Through metaphysis & growth plate.  III (low) through epiphysis to plate & along growth plate.  IV (through) through epiphysis & metaphysis.  V (Ram) Crush injury of growth plate	 I incomplete # ± No displacement MX: internal fixation by DHS  II Complete # ± No displacement MX: as Grade I  III Complete # ± Minimal displacement MX: if > 60y Hemiarthroplasty or Total Hip replacement if < 60y ORIF  IV Complete # ± marked displacement MX as III	 A (infra-syndesmotically)  B (Trans-syndesmotically)  C (Supra-syndesmotically)

* Clinical Picture :-

- Pain, swelling, inability to wt bearing on affected leg.
- deformity

* Treatment :-

- One malleolus * :- plaster immobilization. (below knee cast) (if displaced ORIF)
- Two malleoli * :- plaster immobilization (if displaced ORIF) usually ORIF
- fibular * :- ORIF (open reduction & IF)
- Displaced * & dislocation :- ORIF

NB :- indications of ORIF in ankle are :-

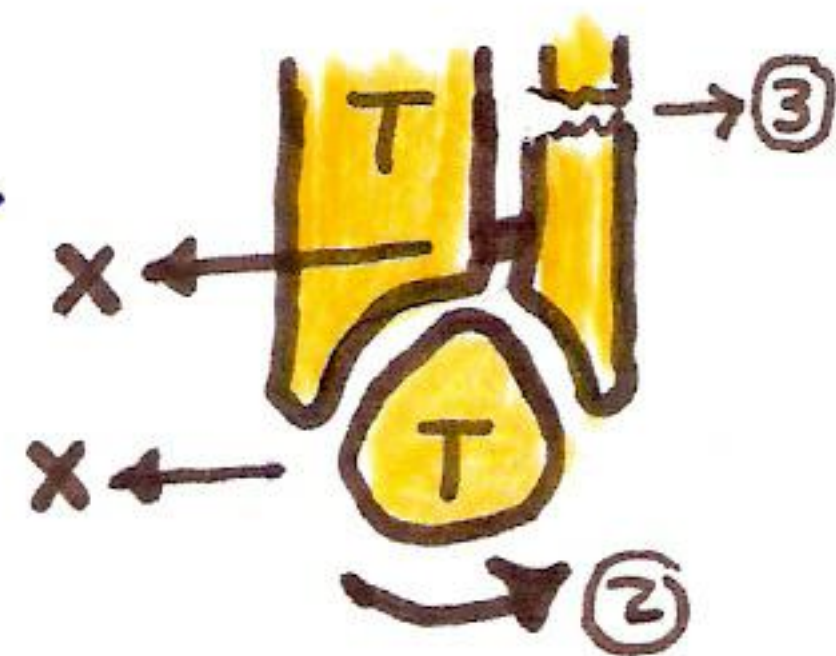
(due to abd + LR)

- ① all * dislocation
- ② all type C fractures
- ③ Trimalleolar * (med., lat & post)
- ④ talar tilt $> 10^\circ$

Toronto N

NB :- Tibio-fibular diastasis consists of :-

- ① rupture of medial lig. & inf. tibiofibula lig.
- ② lateral shift of talus.
- ③ fracture of shaft of fibula



Ankle lig. injury

* Mechanism :- sudden twisting with $\begin{cases} \text{eversion} \rightarrow \text{medial lig (deltoid lig)} \\ \text{inversion} \rightarrow \text{lateral lig.} \end{cases}$

* C/Picture :- Pain, bruising, swelling, tenderness, Passive in/eversion Painful

* investigation :- X-ray (localized soft tissue swelling, avulsion * lat. malleolus)

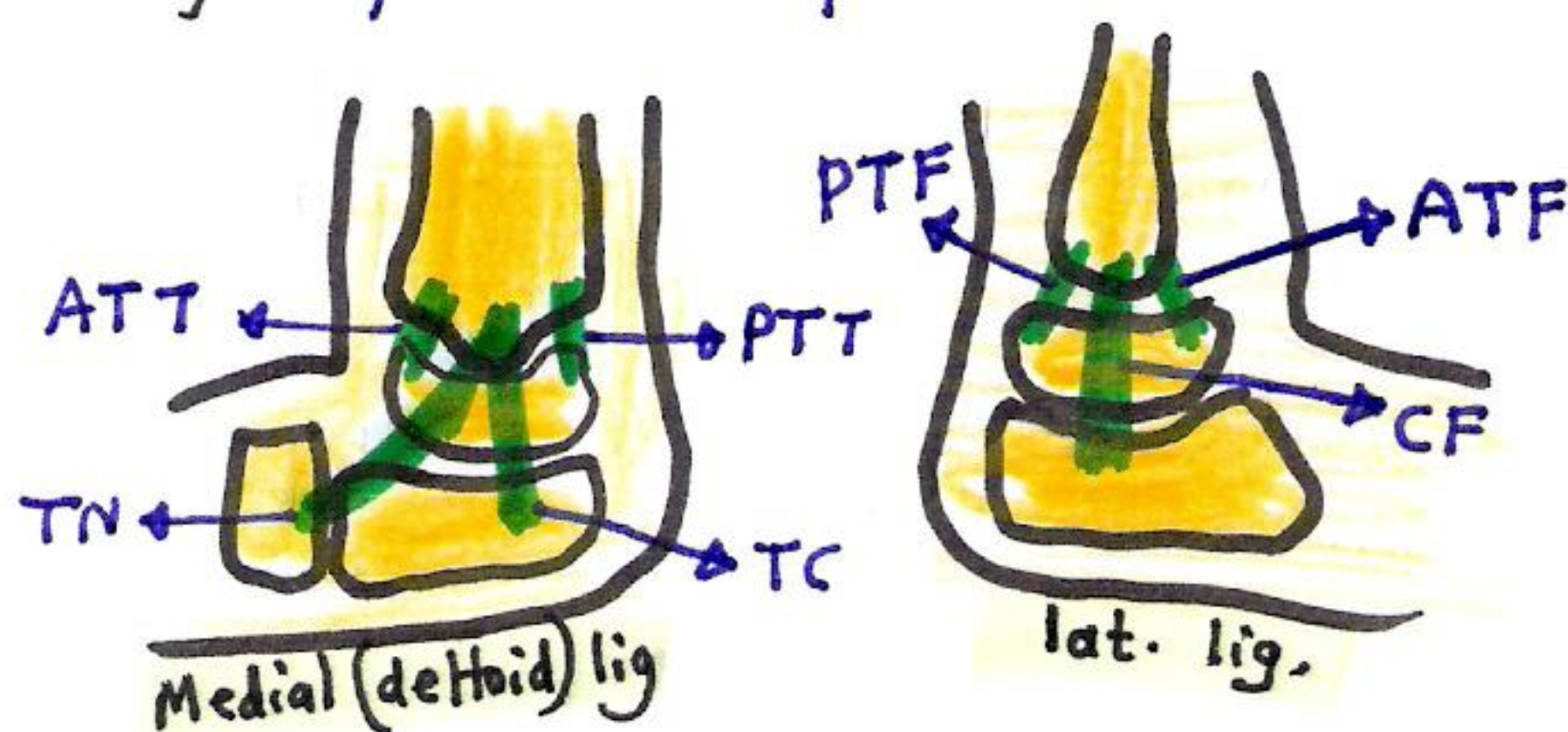
* Treatment :- Grade I (microscopic tear) :- Rest, Ice, Compression, Elevation (elastic bandage)

Grade II (macroscopic tear) :- strap ankle in dorsiflexion & eversion 4-6 wks

Grade III (complete tear) :- operative repair.

ATT = ant. talotibial
PTT = Post " "
TN = Tibio Navicular
TC = " calcaneal
ATF = Ant. talo fibular
PTF = Post. " "
CF = calcaneo-fibular

Toronto Note



⑧

Classification of ligament inj. :-

- Grade I → mild ankle inversion injury (no tear, intact fibers only stretch)
- II → 25-50% torn fibers.
- III → 50-75% torn fibers.
- IV → complete torn

Radiological classif. of lig. inj. :-

- Grade I → 0-2 mm (conservative: ice, analgesia, elastic bandage, rest 1 wk)
- II → 2-5 mm (as I + plaster "backslap" 2 wk)
- III → 5-10 mm (as II + plaster for 6 wk).
- IV → >10 mm (1 cm) (surgical repair, plaster 3 wk, physiotherapy)

NB: surgery must done within a week [after 1 wk fibrosis occurs].

Achilles tendon rupture :-

- * **Mechanism:** - loading activity, stop & go sports (e.g. tennis, basketball)
- Secondary to chronic tendonitis, steroid injection

* **Clinical Picture:** - audible pop, sudden pain, palpable gap, weak plantar flexion, +ve Thompson test (no passive plantar flexion)

- * **Treatment:** - low demand or elderly → cast foot in plantar flexion 8-12 wk
- high demand → surgical repair + cast 6-8 wk.

* **N.B.:** - most common site of rupture is 2-6 cm from insertion b/c blood supply is the poorest

L
RG





¿QUÉ ESTÁIS
MINAR ASÍ?

CANALES ESTARÁ
DE BAJA TRES
SEMANAS CON
UN ESGUINCE
DE TOBILLO

RC



2

Y
MÁS





Weber C

KNEE INJURY

MENISCAL TEARS

- Medial meniscus is more prone to injury than lateral meniscus because medial meniscus is more fixed as lateral meniscus is separated than capsule & ligament by the tendon of popliteus.

* Mechanism :-

- Twisting force with knee semiflexed or flexed.
- common in male <45 yrs especially football players & skiing

* Pathology :-

- Types (A) Longitudinal tear :-

1. bucket-handle tear :- tear extends throughout the meniscus, but both ends remain attached with displaced central part toward middle of joint causing locking & limit full extension

2. Anterior horn tear.

3. Posterior horn tear.

4. Coronary ligament tear. (only type causing hemarthrosis)

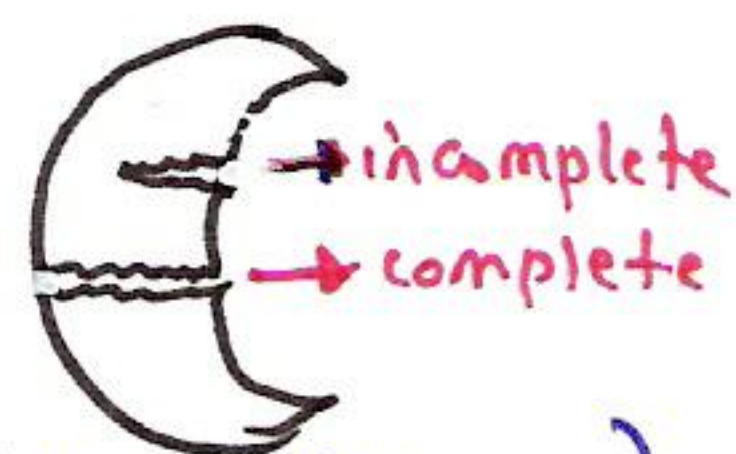
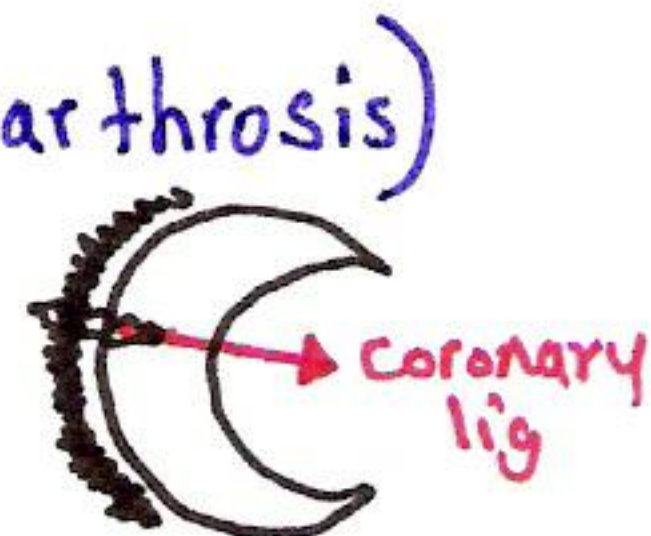
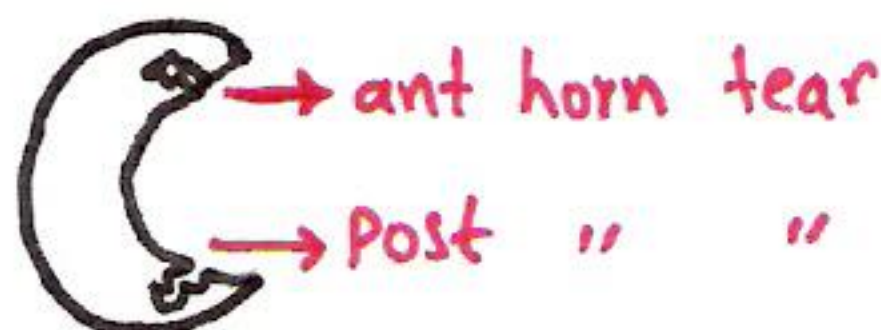
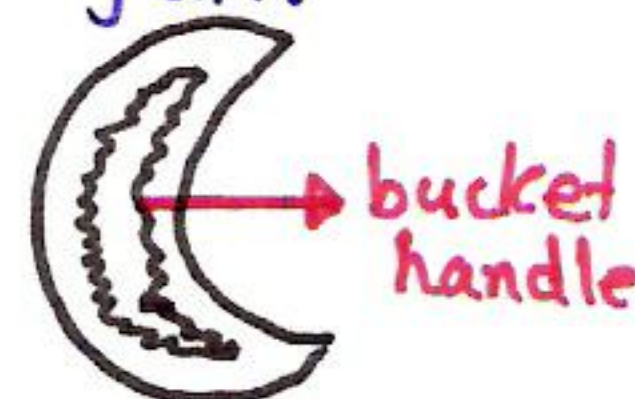
(B) Transverse tear :-

1. incomplete transv. tear (Parrot beak)

2. complete transv. tear (usually iatrogenic)

* Clinical features :-

- immediate pain, inability to extend knee fully (locking of knee)
- effusion (no hemarthrosis except in coronary lig. tear), the effusion is serous (within 24 hr). (not hemarthrosis)
- O/E: +ve McMarry test.



*Investigations:-

- X-ray to exclude bone fracture.
- MRI → soft tissue injury.
- arthroscopy → diagnostic & may be therapeutic.

*Treatment :-

- Arthroscopy → (excision) repair/partial meniscectomy
- If not locked → ROM & strengthening.

NB:- Knee history (CLIPS):- **C**licking, **L**ocking, **I**nstability, **P**ain & **S**welling

CRUCIATE LIG. INJURY

- Anterior cruciate is more commonly injured than Post. (ACL > PCL)

*Mechanism :-

- Anterior displacement of tibia upon femur → ACL injury and posterior driving of tibia upon femur → PCL injury. / sport int., RTA

*Diagnosis:-

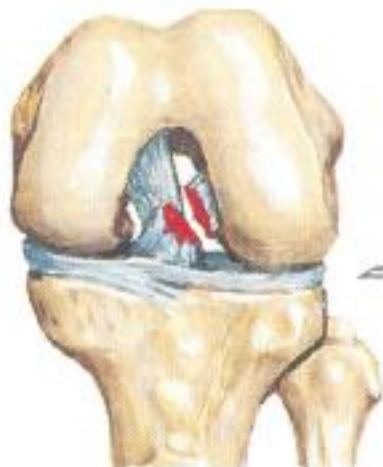
- history & examination → Pain, swelling (hemarthrosis → immediate)
+ve drawer test, Lachmann test & sag test.

*Treatment:-

- Usually conservative (plaster)
- if failed or associated avulsion * → ORIF, suture & reinforcement.

D/D of loose body in knee :- (commonest joint)

- ① Osteochondritis dissecans
- ② osteophyte (osteoarthritis).
- ③ synovial chondromatosis → cartilage metaplasia
- ④ Bucket handle → meniscal injury.
- ⑤ chip * of articular surface
- ⑥ Charcot's disease → Neuropathy in DM → loss of sensation → repeated trauma → separation of large osteo cartil. bodies.



Effusion composed mainly of blood most frequently associated with rupture of cruciate ligament



Effusion containing fat droplets and blood indicates intraarticular fracture. Fat forms layer over bloody fluid



Effusion of clear yellowish joint fluid usually associated with chronic meniscal tears

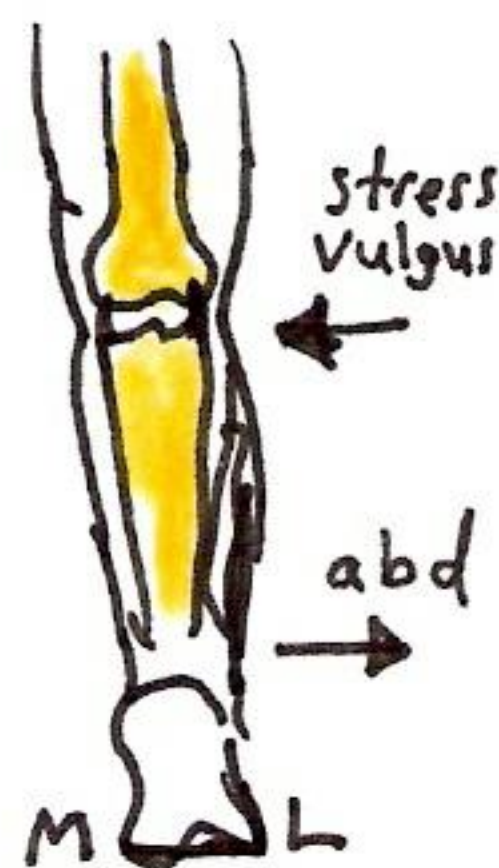
F. Netter M.D.
© 1987

COLLATERAL LIG. INJ.

- Medial collateral lig. is more commonly injured than lateral.

*Mechanism:-

- Abduction of tibia upon femur (stress valgus) → medial collateral inj, & stress varus → Lat collateral inj

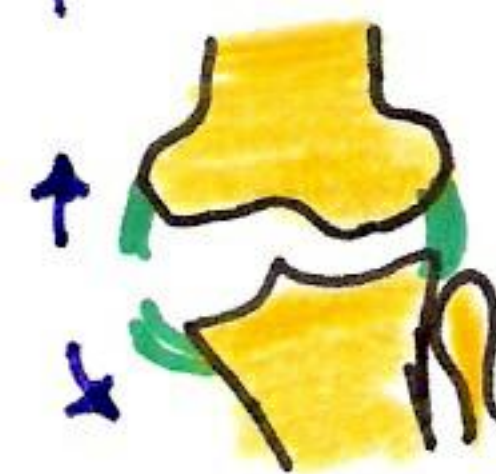


*Clinical Picture:-

- Pain, tenderness over lig., swelling (hemarthrosis), ecchymosis, bruises
- in partial tear → Pain less severe, inject local anaesthesia, after 5 min pain subside.

*investigation:-

- X-ray to exclude associated bony injury.
- stress X-ray done under GA (joint will open medially if medial inj) ie stress valgus test.



*Treatment:-

- If partial tear → conservative ttt with bandage (7-10 days) ^{pain relieve NSAID} even 6 wk
- If complete tear → suturing & reconstruction. within 1 wk

O'Donoghue triad:- (unhappy triad)

- ① ant. cruciate inj. ② medial collateral lig. inj. ③ ~~lateral~~ ^{Medial ?} meniscus inj

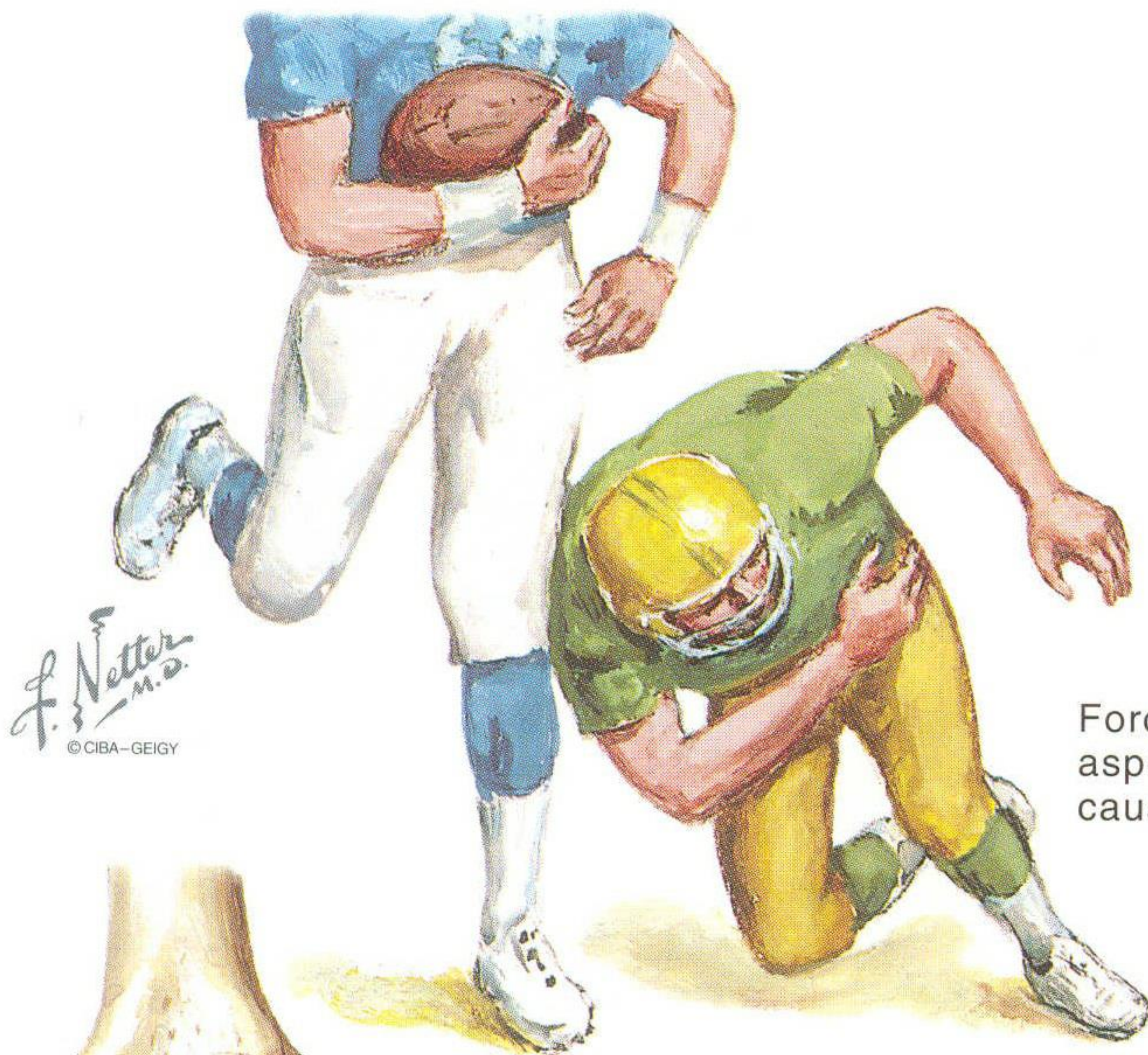
Pellegrini sign:-

- X-ray shows thin plaque of sclerosis close to medial condyle of femur due to incomplete avulsion of med. collateral lig causing ossification of small hematoma.

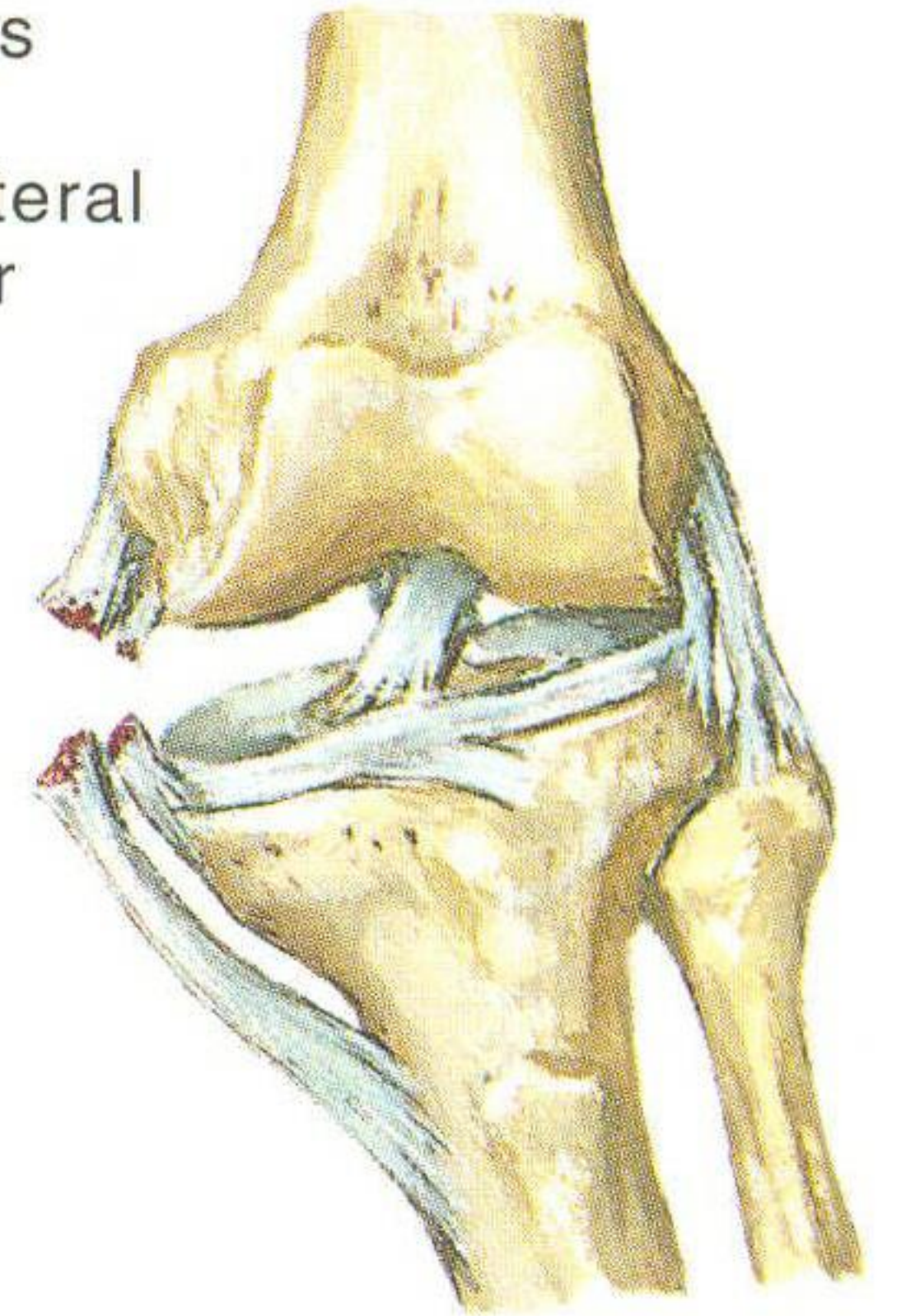
(incomplete avulsion → hematoma → Ca^{++} → new bone).



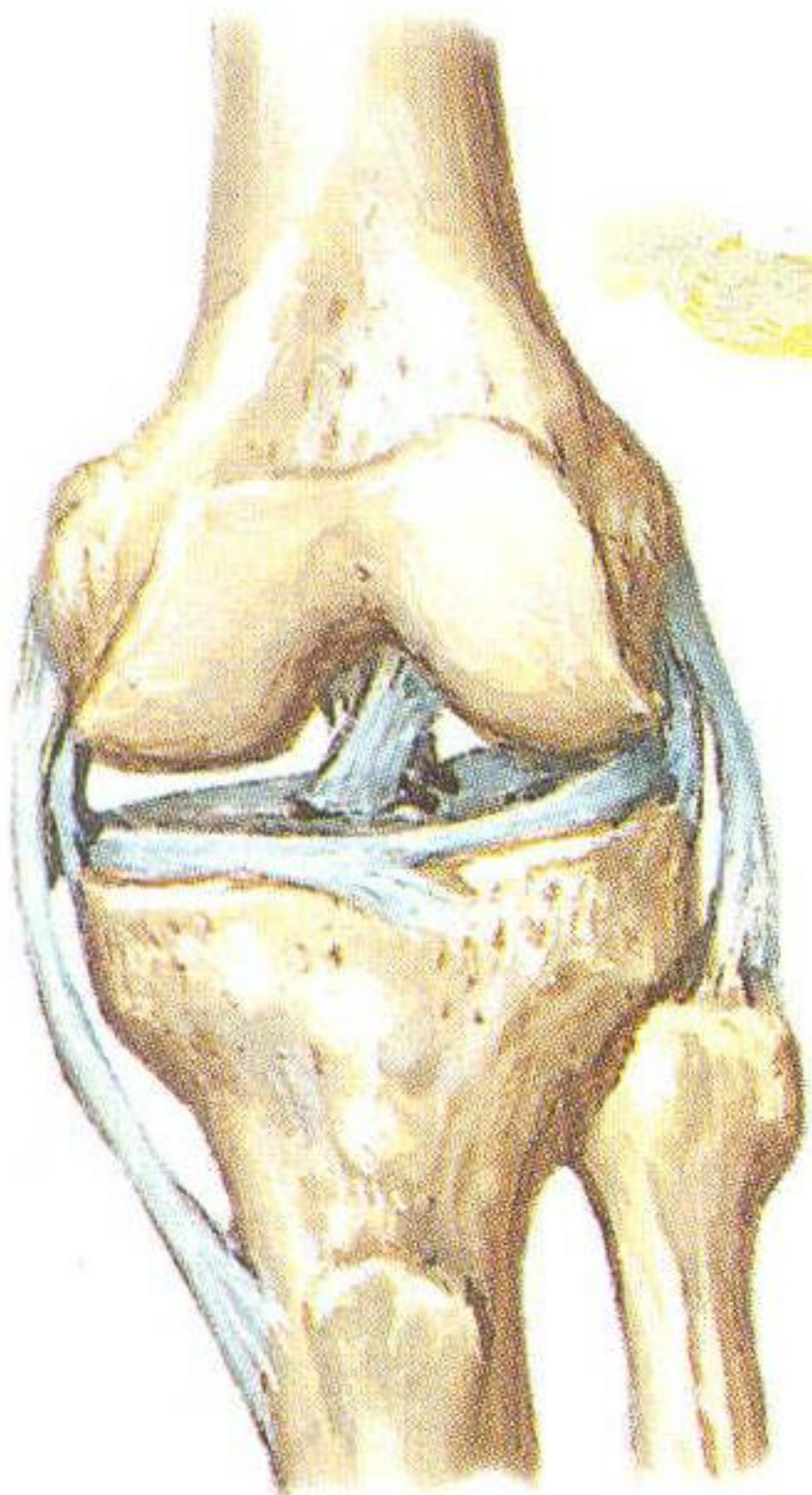
Diagnosis of Ligament Sprains



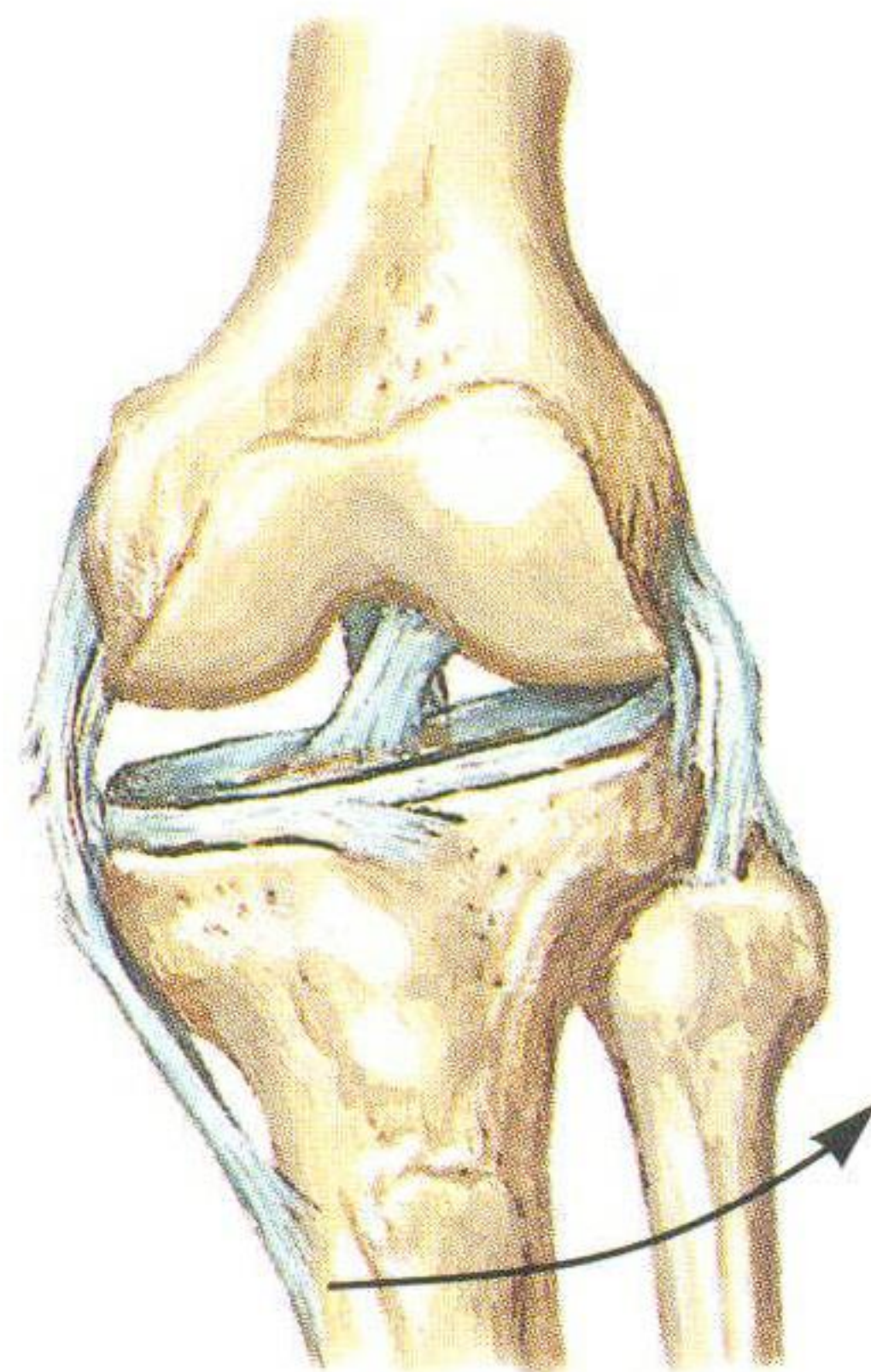
Valgus stress may rupture medial collateral and capsular ligaments



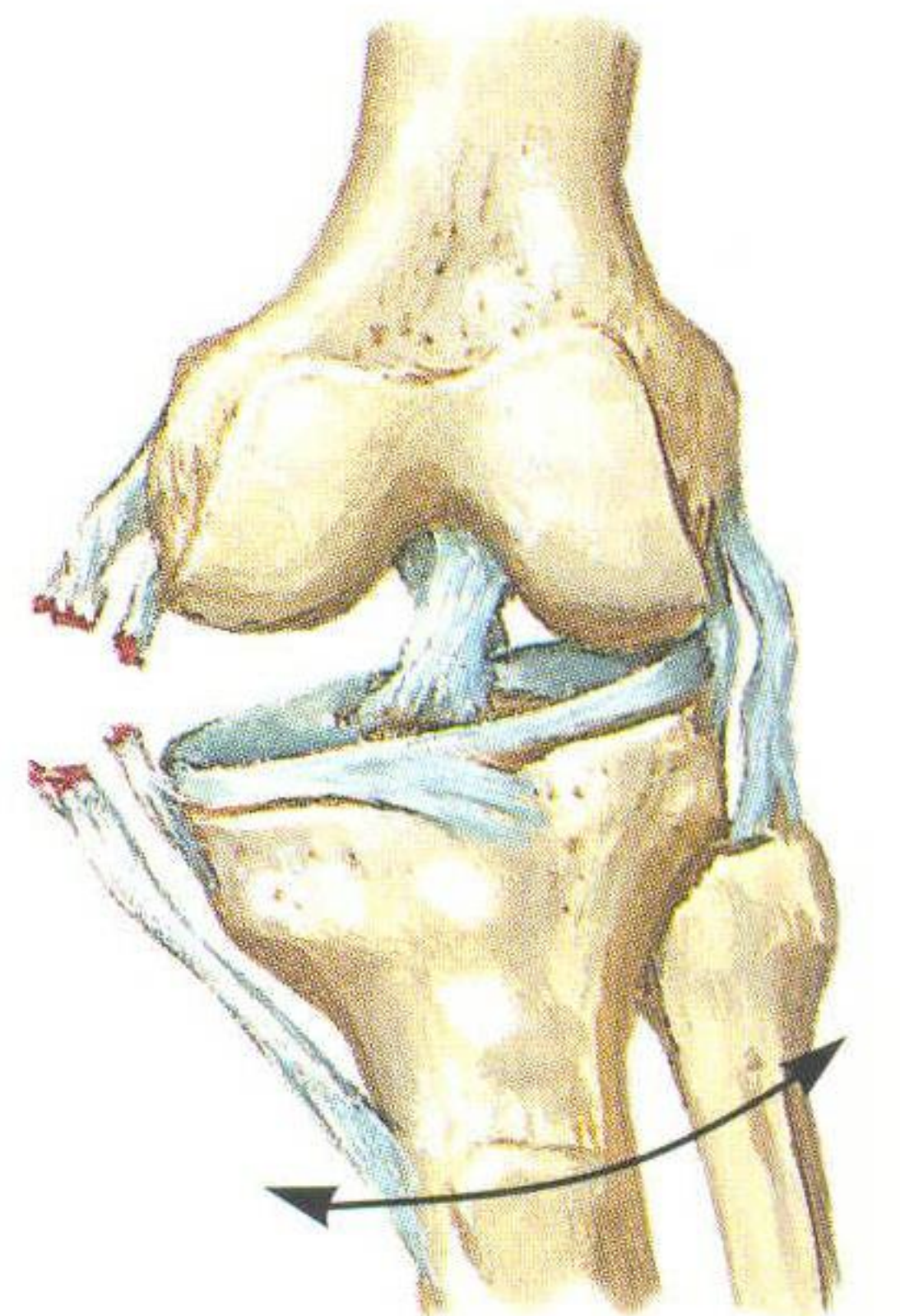
Forceful impact on posterolateral aspect of knee with foot anchored causes valgus stress on knee



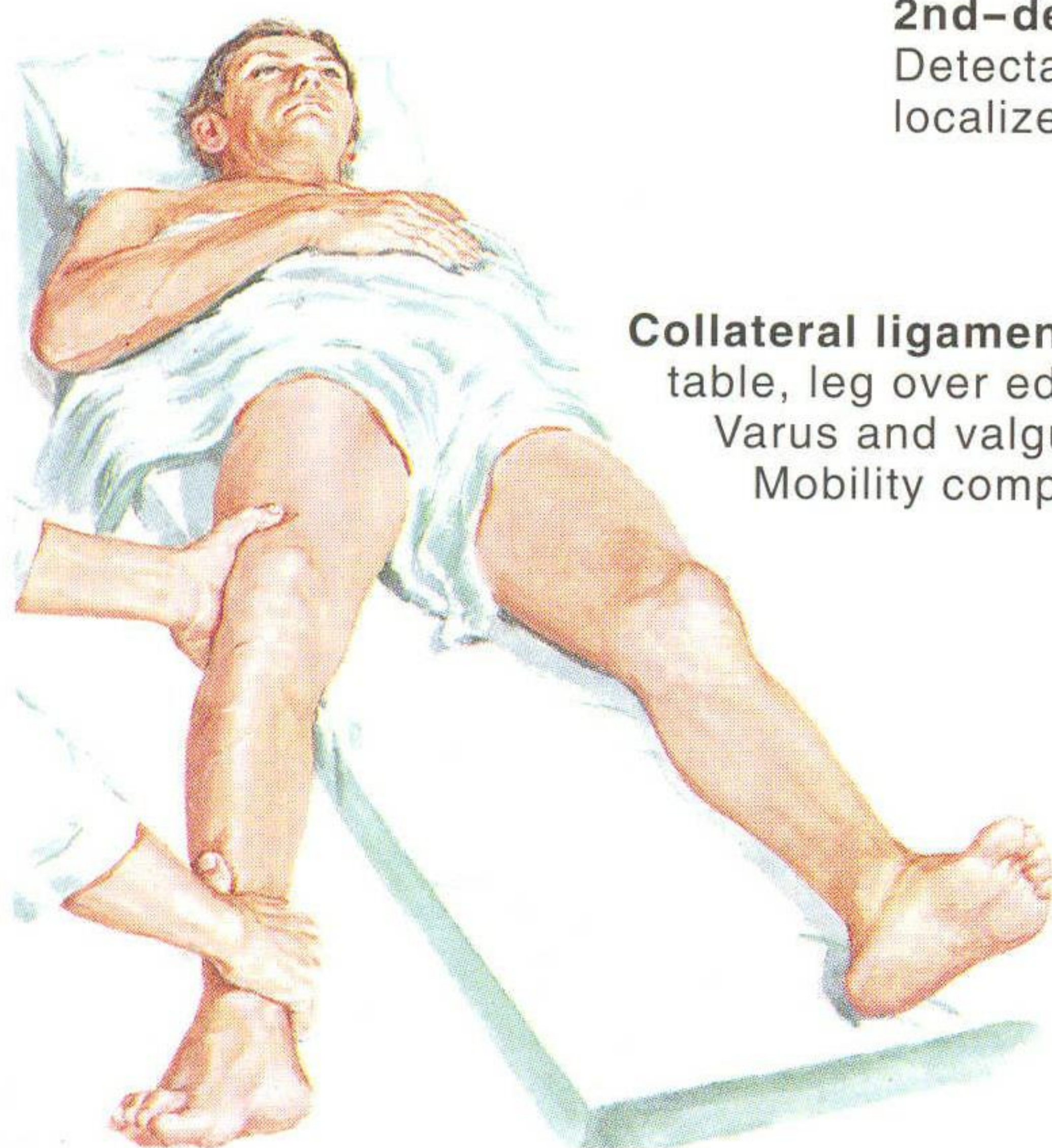
1st-degree sprain
Localized joint pain and tenderness but no joint laxity



2nd-degree sprain
Detectable joint laxity with localized pain and tenderness

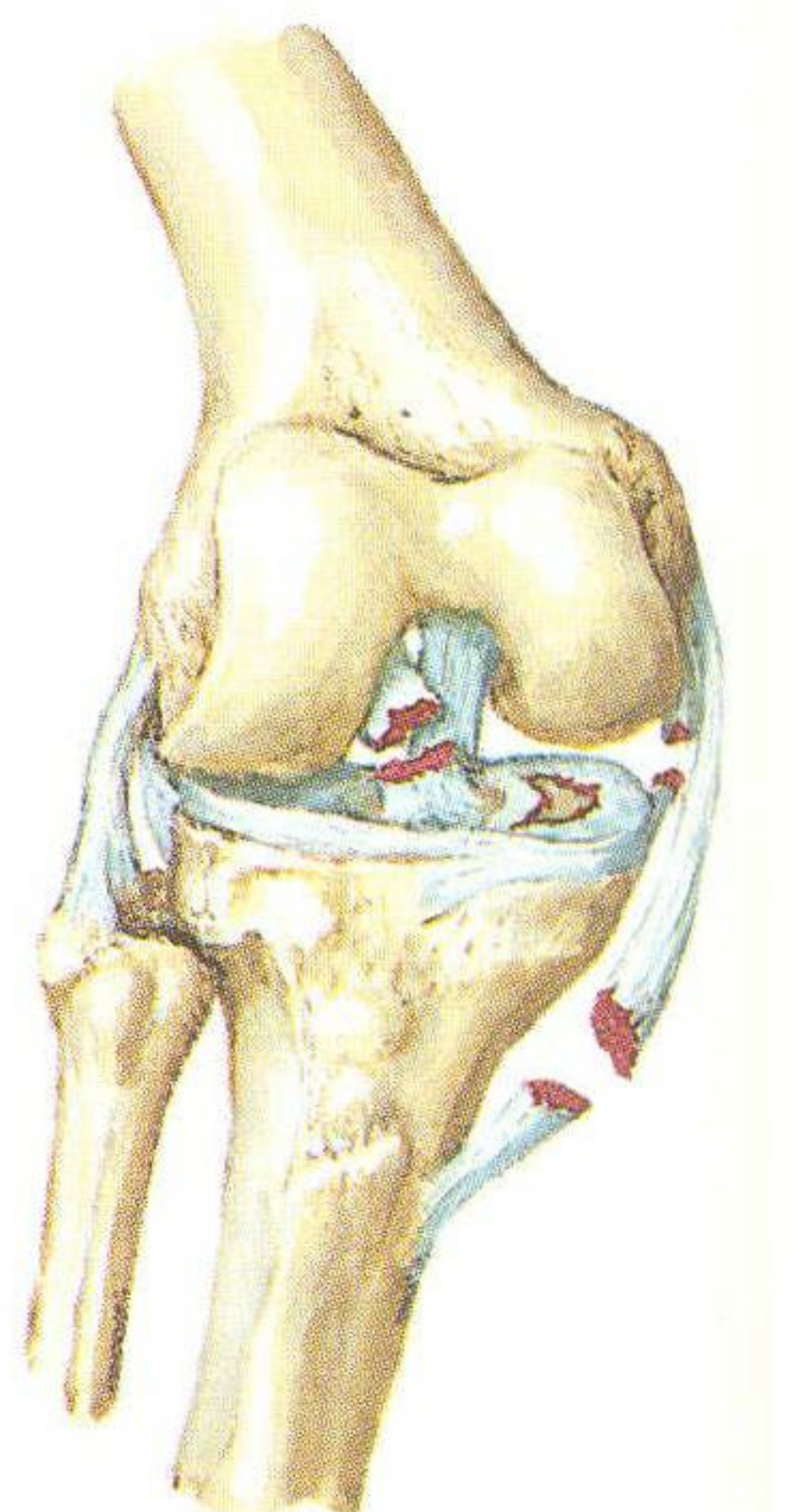


3rd-degree sprain
Ligaments completely disrupted and joint grossly unstable



Collateral ligament stress test. Patient supine on table, leg over edge of table, knee flexed ($\sim 30^\circ$). Varus and valgus stresses applied to knee. Mobility compared with that of uninjured side

Triad of O'Donoghue. Rupture of medial collateral and anterior cruciate ligaments with tear of medial meniscus



Meniscal cyst

- Lateral meniscus is more affected than medial one.
- * **Aetiology**:- spontaneous or history of trauma.
- * **Pathology**:- fibrous tissue proliferation $\rightsquigarrow$ small cystic cavities (honey combed) containing gelatinous fluid.
- * **C/Picture**:- swelling (pain at night) in lateral joint line, more obvious with knee flexed + tenderness.
- * **treatment**:- symptomatic cases $\rightarrow$ excision of cyst & $\pm$ meniscus.

D/D of popliteal fossa swelling:-

- ① Baker's cyst
- ② semitendinosus bursitis.
- ③ popliteal artery aneurysm, varicosity of short saphenous.
- ④ enlarged LN., neurofibroma
- ⑤ lipoma, dermoid cyst, ----etc.

* Baker's cyst:-

- herniation of synovial membrane into popliteal fossa.
- Caused secondary to osteoarthritis, Rhe arthritis, TB arthritis
- usually asymptomatic, if large $\rightarrow$ interfere w flexion.
- complicated by rupture, infection, if rupture $\rightarrow$ sudden pain & swelling of calf (mimic DVT)
- treated by excision if large [if small, asymptomatic $\rightarrow$ No $\uparrow\uparrow$]
- Dx by US, clinically, arthrograph $\uparrow\uparrow$ underlying dis.

* semitendinosus bursitis:-

- inflammation of burs of semimembranosus.
- common in children, usually asymptomatic & spontaneously disappear, if large $\rightarrow$ surgical excision.

NOTES :

Complications of total knee & hip replacement :

- 1-thromboembolism and anaesthesia complications
- 2-dislocation and loosening
- 3-wear, osteolysis, infection, bleeding
- 4-neurovascular injury
- 5-alteration of limb length
- 6-reflex sympathetic dystrophy

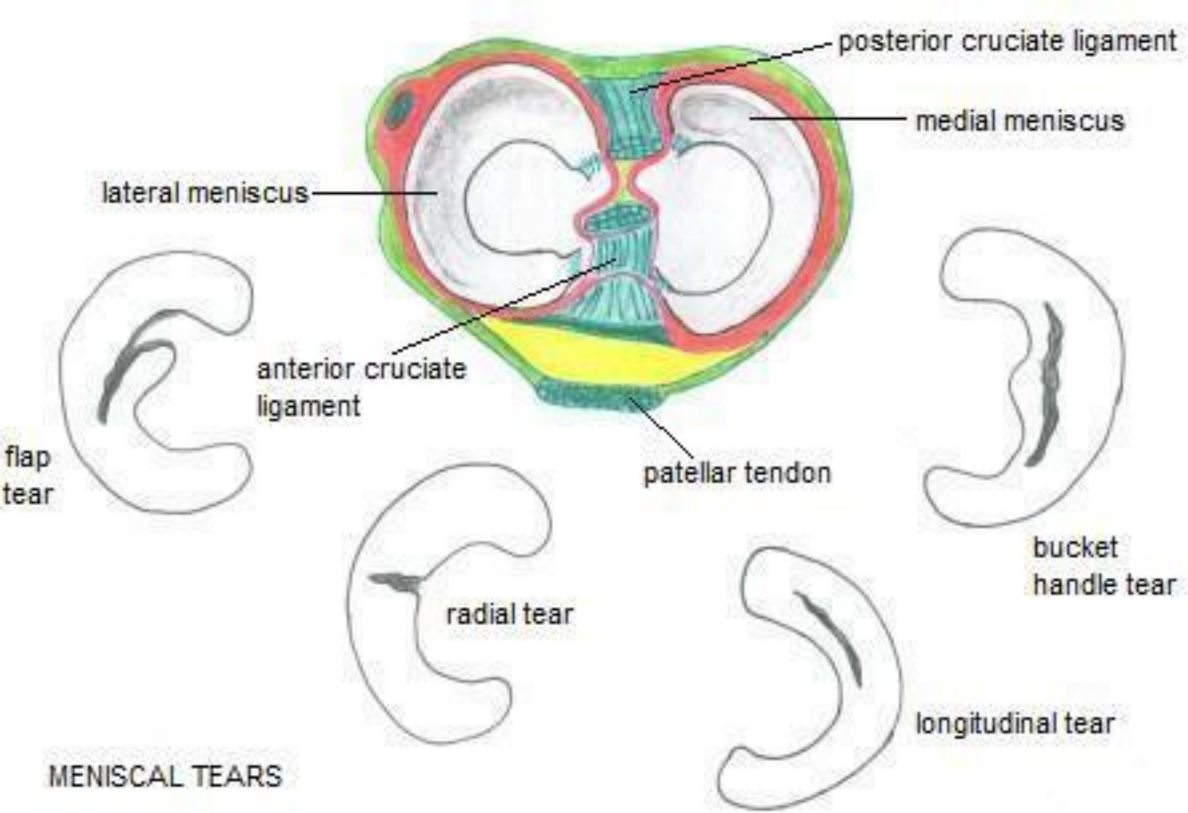
Causes of giving way in knee :

- 1-cruciate ligament injury
- 2-meniscial injury
- 3-guadriceps atrophy
- 4-loose body in knee

NB:

- Knee effusion(serous):takes time and feels as bag of fluid.
- Haemarthrosis immediate and doughy sensation.











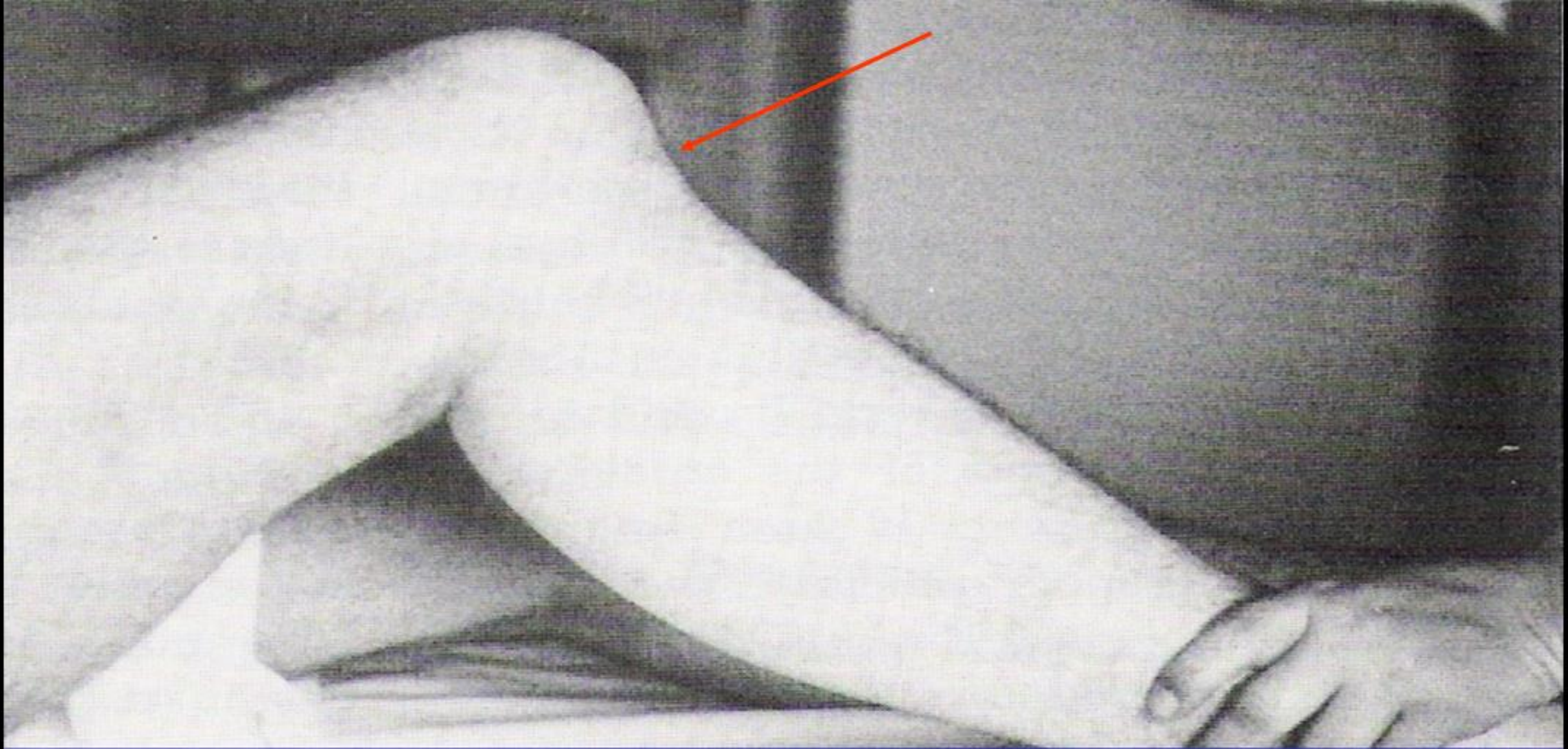


Compressed
fracture of
lat. Plateau
of tibia



Total knee
replacement





Posterior sag

In PCL injury

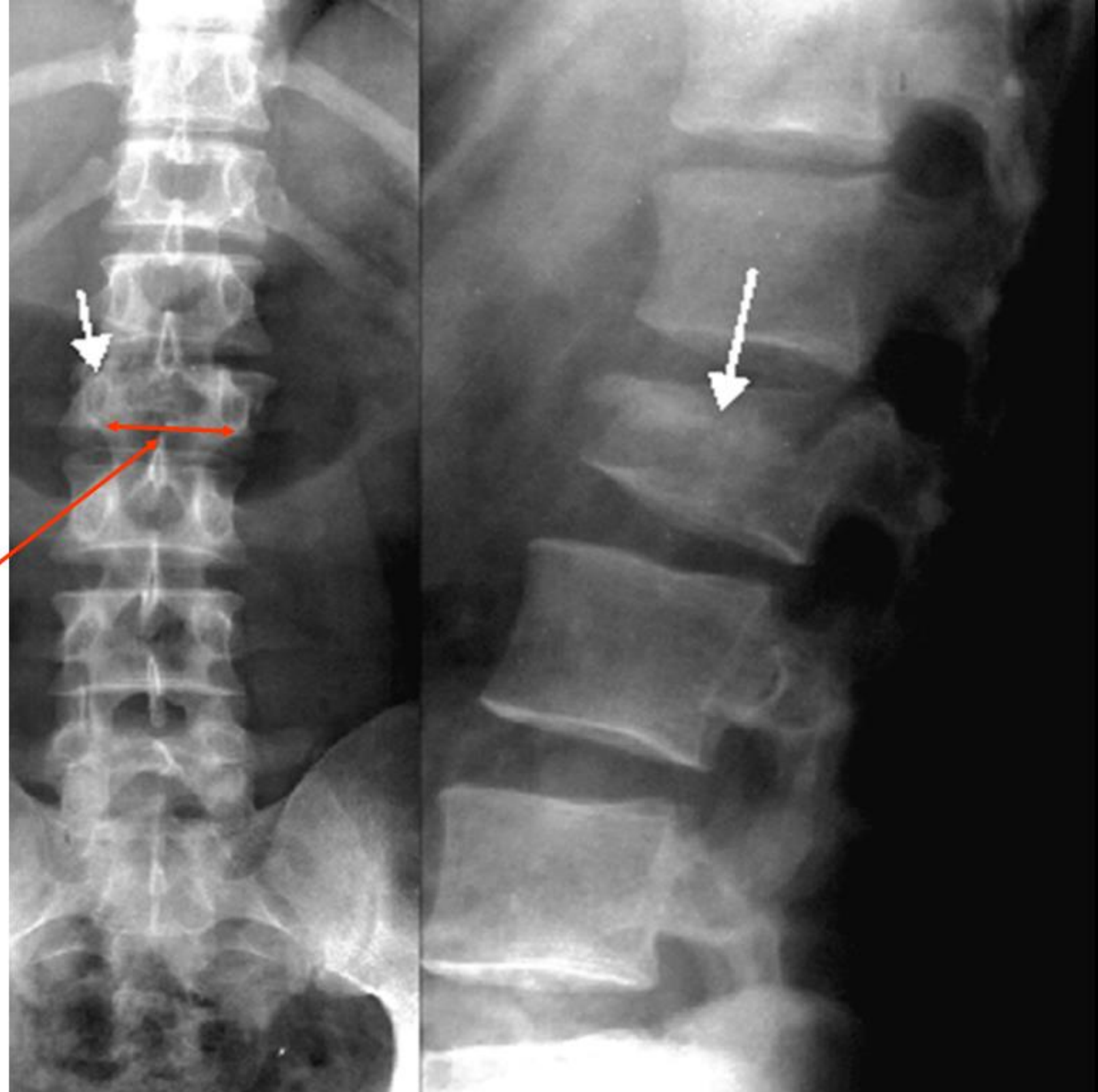
Burst fracture of spine

A-P view
showing:

Increase in
interpedicular
space

OR

wedge
fracture

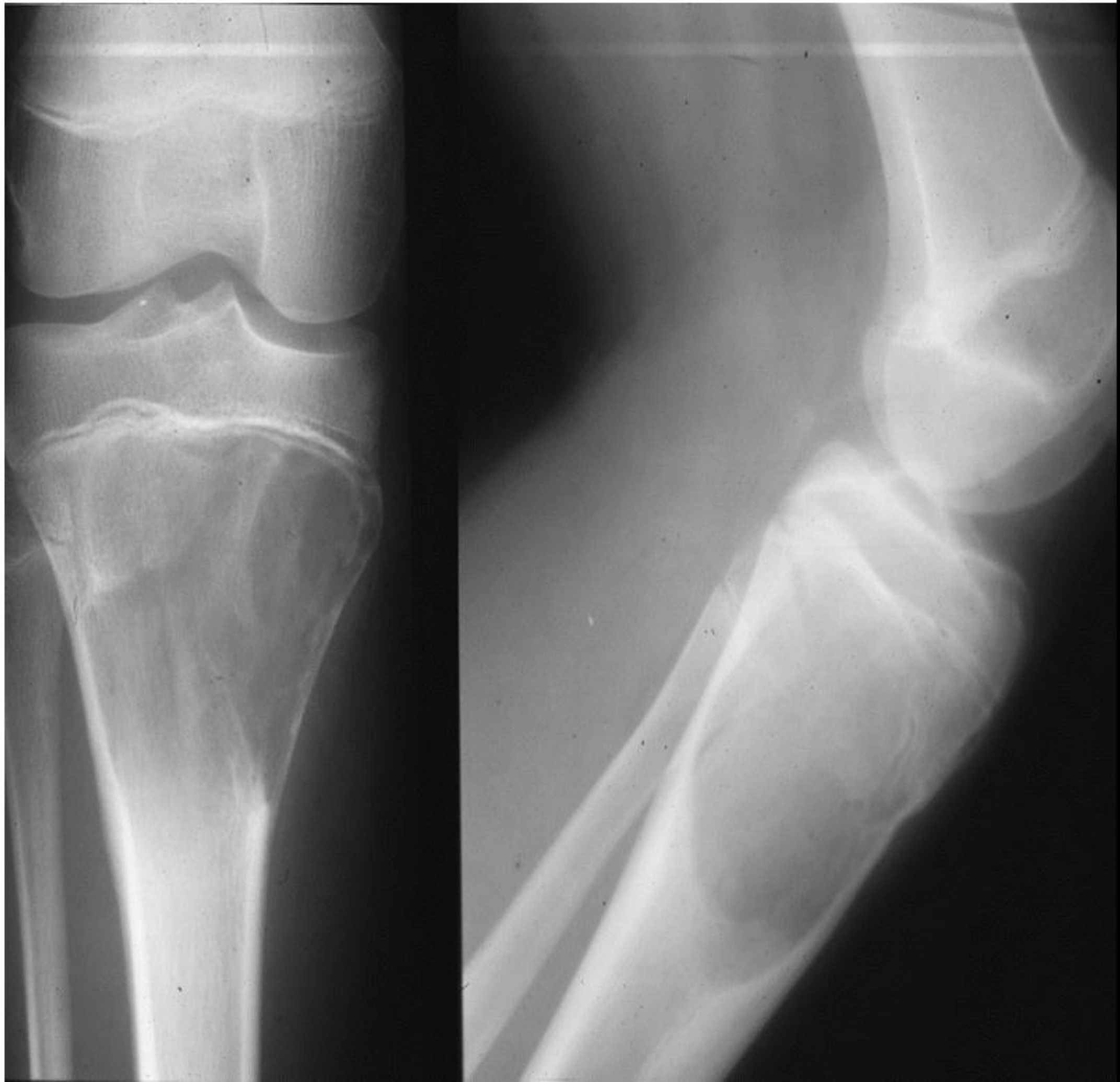


aneurysmal
bone cyst

(bc young pt)

Treatment:

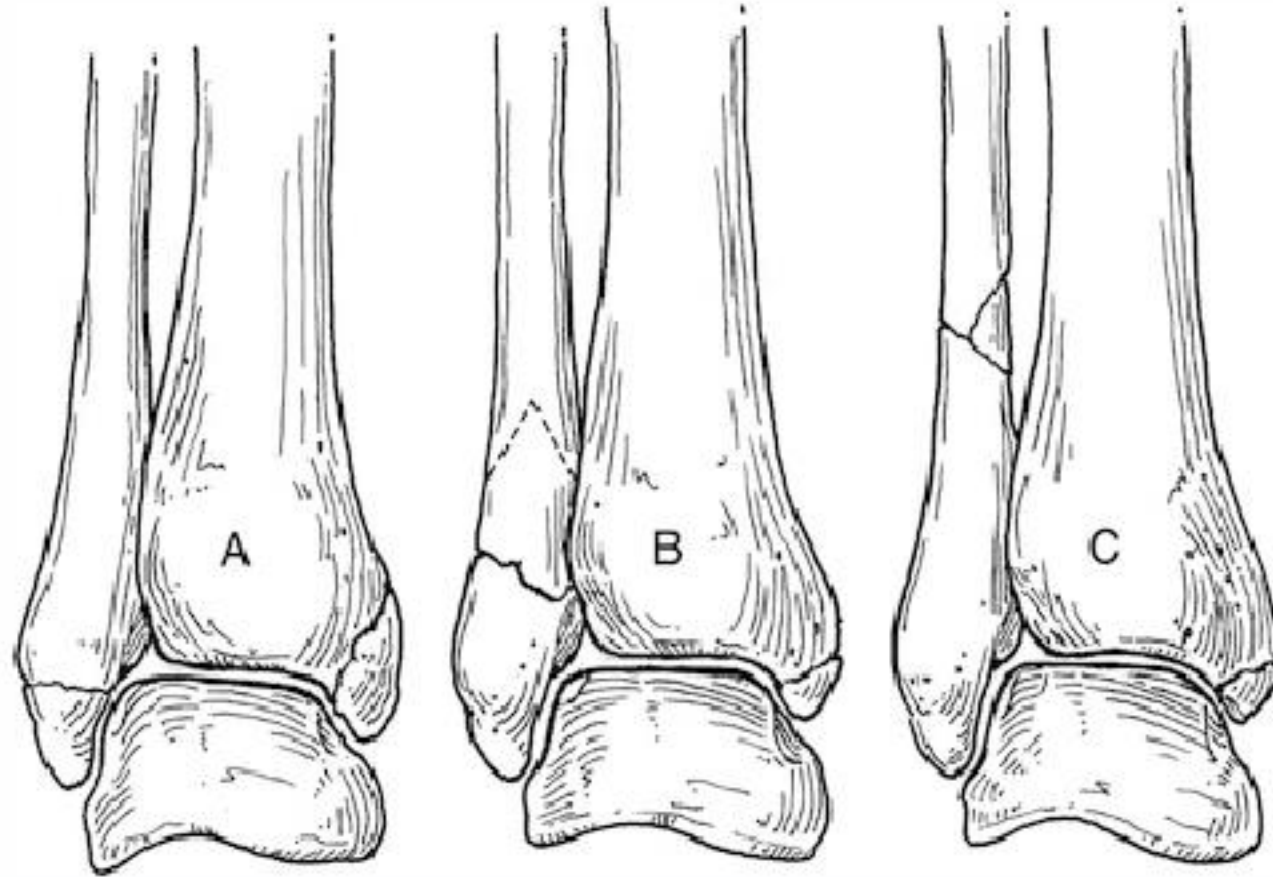
Curettage +
bone graft



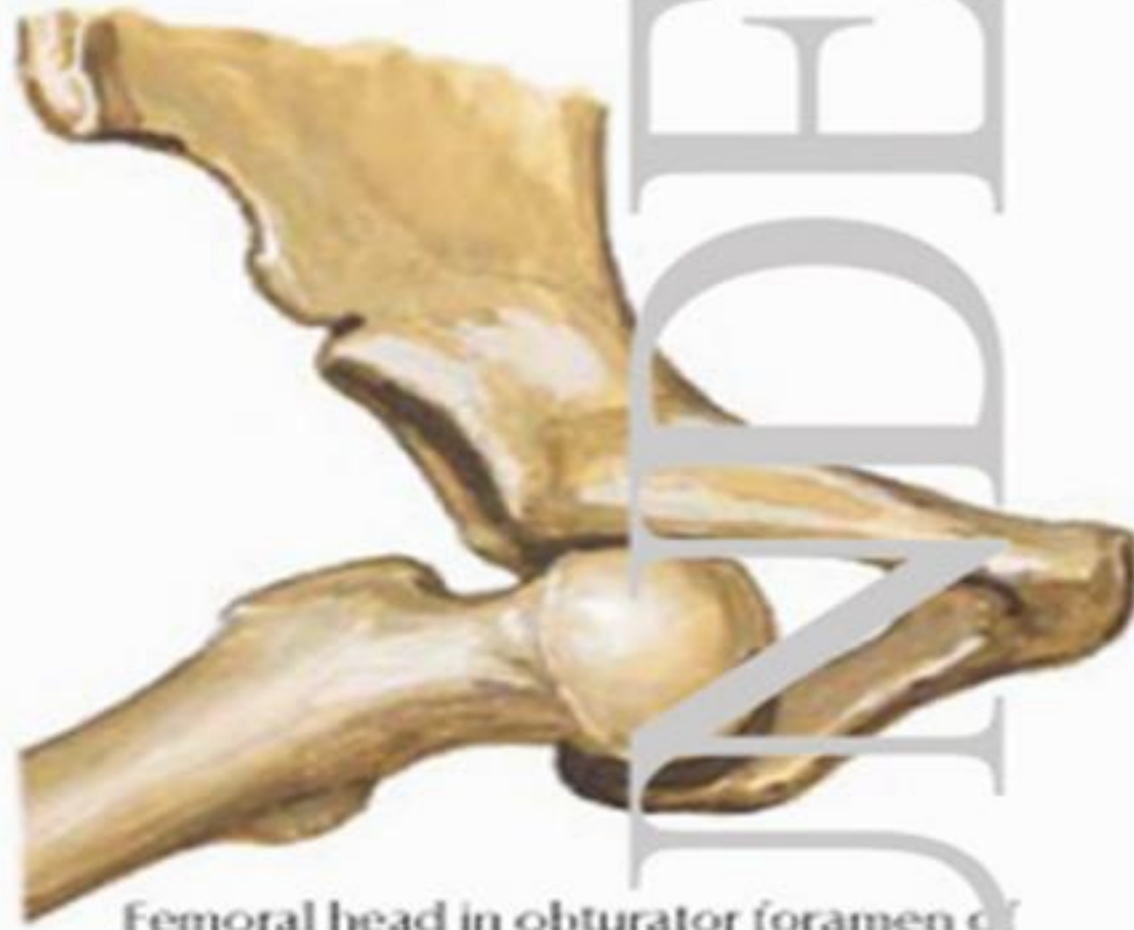
Giant cell tumor



Danis-Weber classification for ankle fractures



Anterior hip dislocation

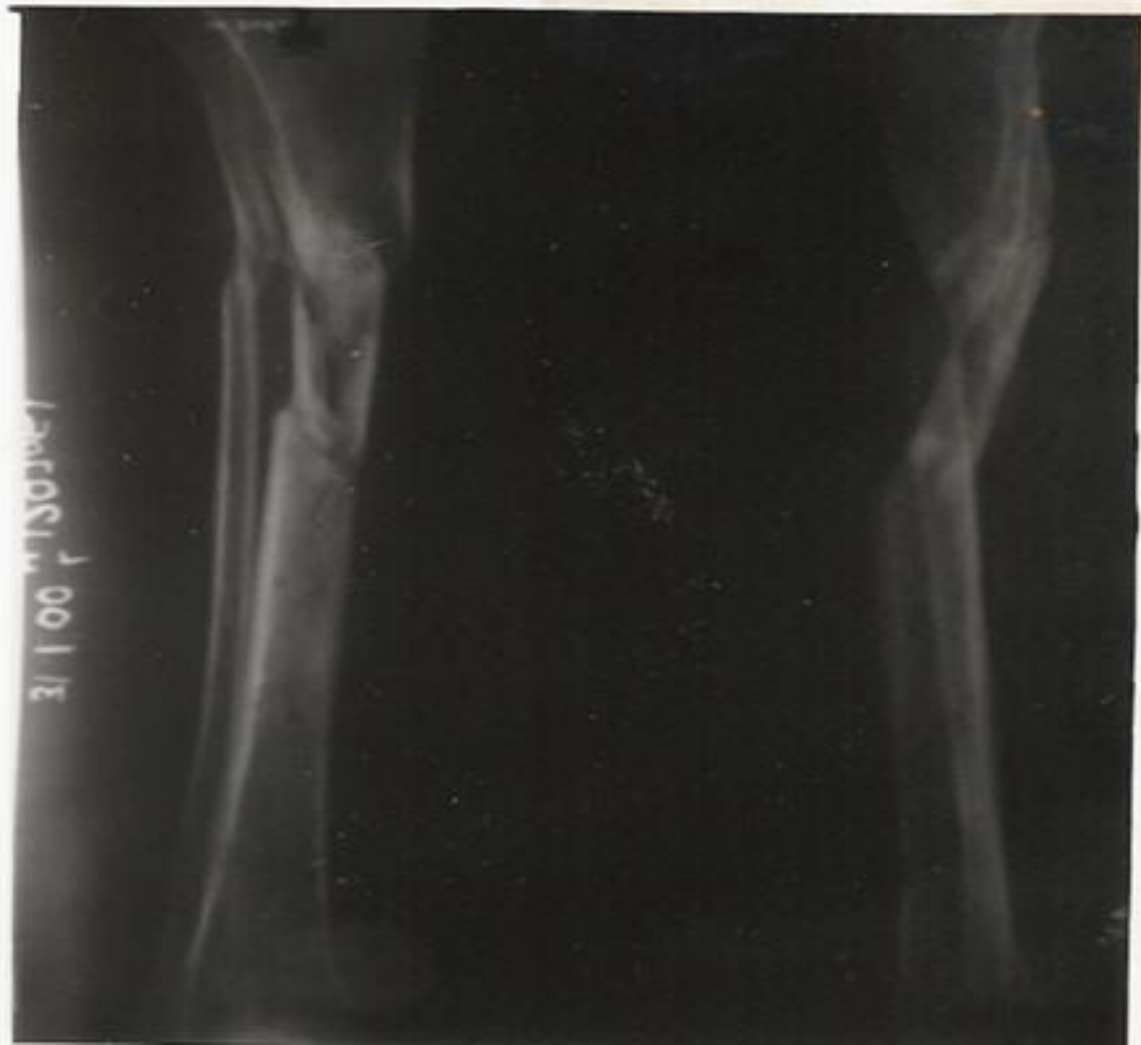


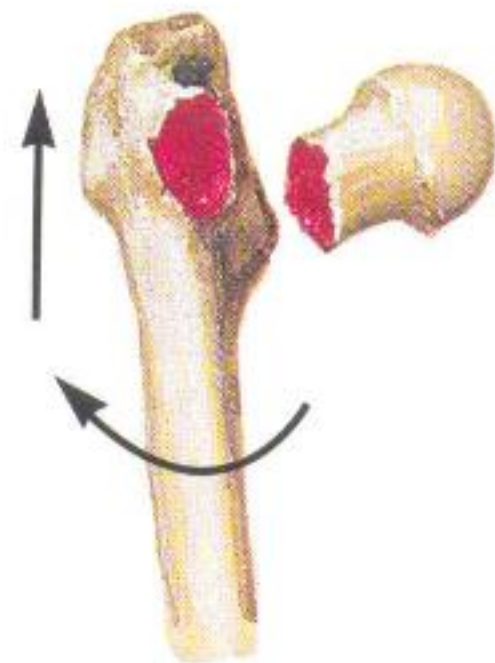
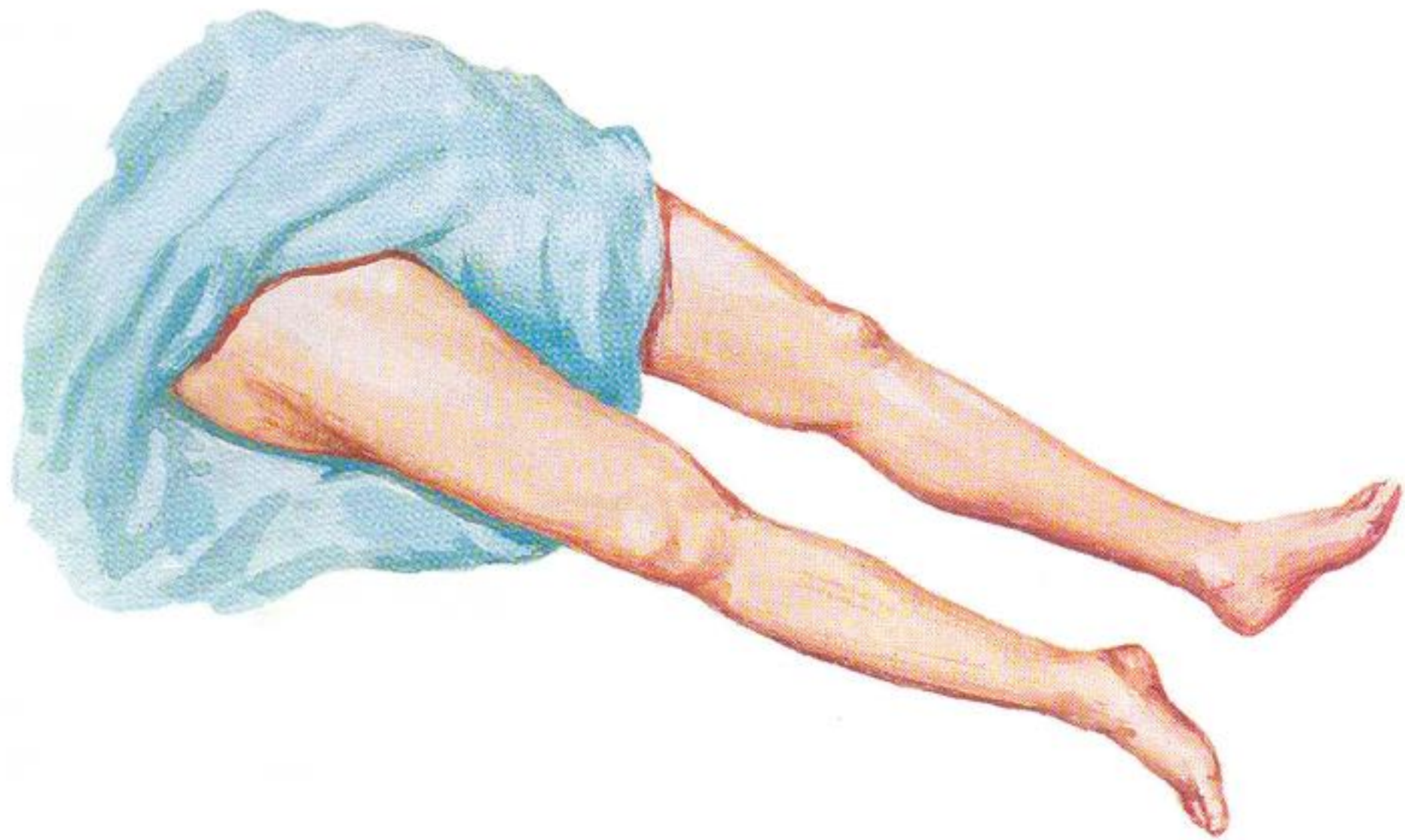
Femoral head in obturator foramen of pelvis; hip flexed and femur widely abducted and externally rotated.



Floating knee

كسر فوق
وتحت الركبه
في نفس الوقت







FRACTURE OF SPINE

* Mechanism :- usually indirect :-

- 1- excessive movement (hyperflexion, hyperextension, rotation).
- 2- Vertical compression force. (fall of heavy object on head).

* Notes :- common type of injury in neck is whip-lash injury
(sudden recoil of head in rear-end automobil collisions)

- flexion tends to cause → wedge compression fracture.
- flexion with rotation → subluxation, dislocation or ✱ dislocation
- hyperextension may cause → extension subluxation (rupture ant. long. lig)
 - ✱ of neural arch, odontoid process & atlas
 - burst ✱ of vertebral body.

* Stability :-

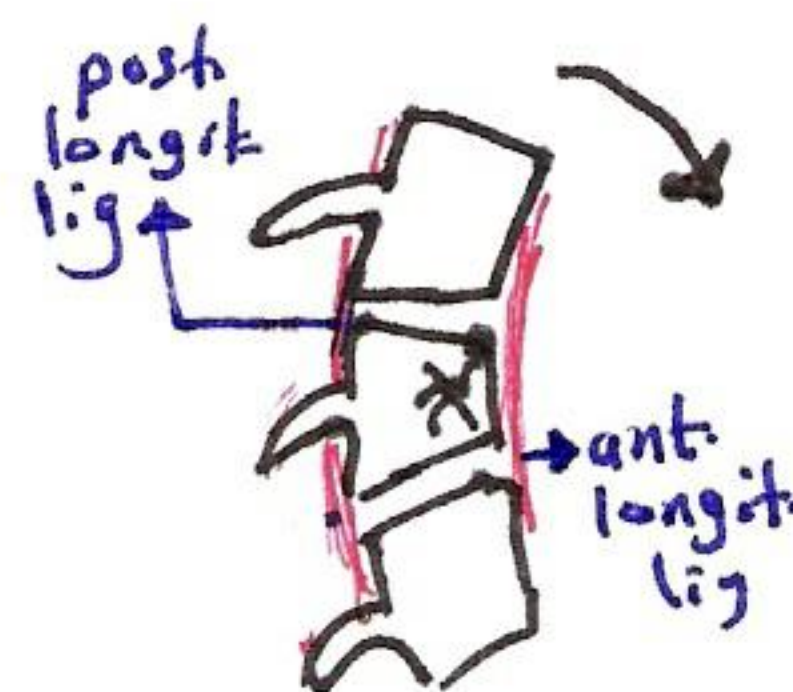
- the injury is stable if post. longitudinal ligament is intact
(if ruptured post lig. ^{or ant.} → unstable), if ant. & post. rupture → dislocation & death

* Diagnosis :-

- x-ray (AP, lateral, oblique 45°, swimmer view for C7, open mouth x-ray for C1, C2).
- CT scan.

① Wedge compression ✱ :-

- caused by severe flexion force (hyperflexion)
- It is a stable fracture (intact post. lig.)
- ttt by rest in collar



② Burst * :-

- caused by vertical compression force (axial load)
- It is stable, but comminuted * can cause spinal cord injury by fragments of * bone.
- ttt by rest in collar (if no injury to spinal cord)



③ extension subluxation:-

- caused by severe extension force (hyperextension)
- It is unstable (ruptured ant. lig).
- ttt $\rightarrow$ reduction & fixation in collar.

④ flexion subluxation :-

- caused by flexion rotational force.
- It is unstable (ruptured post. lig.)
- ttt $\rightarrow$ reduction & fixation in collar.



⑤ Dislocation & * dislocation:-

- caused by forward displacement of one vertebra overriding on articular process of another vertebra.
- It is unstable fracture. with spinal cord injury.
- ttt $\rightarrow$ reduction by skull traction (x-ray guided), fix in collar.
 $\rightarrow$ operation indicated if :- ① irreducible locking of articular process (excision of process)
 ② persistent instability (fusion of spine by using bone graft).

⑥ Dislocation of atlanto-axial joint :-

- Caused by flexion force $\rightarrow$ forward displacement, extension $\rightarrow$ backward.
- complete cord transection $\rightarrow$ immediate death.
- ttt :- if no displacement $\rightarrow$ rest in plaster, if displaced $\rightarrow$ reduction.

⑦ fracture of atlas (C1) :-

- caused by vertical compression force.
- diagnosed by open mouth view.
- if displaced → reduction.
 - if not displaced → plaster.

NB:- Orthopaedic : is a Greek word

- (orthos = correct "straight") (paideion = child) ie the art of correcting & preventing deformities in children
- orthopaedic is a branch of surgery concerned with conditions involving musculoskeletal trauma, sports injury, degenerative dis., infections, tumour and congenital disorders.

Prolapsed intervertebral disc

I Prolapsed cervical disc :-

- Commonest site is C₅, C₆ disc.

● each intervertebral disc consists of :-

① Peripheral part (annulus fibrosis) :-

- composed of fibrocartilage rich in collagen fibers that arranged in concentric lamellae.

② Central part (nucleus pulposus) :-

- composed of gelatinous material rich in water.

* Causes :-

- injury (trauma) or spontaneous age degeneration.

* C/Picture :-

① Central protrusion :-

- gives manifestation of cord compression (usually non operable).

② Posterolateral protrusion :-

- gives • neck pain & stiffness, pain radiate to shoulder, upper limb
• sensory impairment & biceps jerk (C₅, C₆).

* Treatment :-

- conservative → rest, analgesia (main tt).

- operative → not recommended (dangerous effect).

NB :- no intervertebral disc between C₁, C₂. (atlanto-axial joint).

II Prolapsed lumbar disc :-

- Commonest site is (L₄-5) or (L₅-S₁)

* Causes :-

- trauma (obese more affected), spontaneous age degeneration.

* Mechanism :-

- ① Part of gelatinous material protrude a defect in the annulus fibrosis (in a weak point $\rightsquigarrow$ Posterolateral). (Rent)
- ② protrusion of the torn annulus itself posteriorly causing:-
 - back pain (if small protrusion $\rightarrow$ stretch post. lig.).
 - Sciatic pain (if large protrusion that herniate through post. ligament $\rightarrow$ nerve compression $\rightarrow$ Pain $\rightarrow$ radiate to lower limb)

NB:- If L₅ affected (in L₄-5 prolapse):-

- 1- pain in buttock, lateral aspect of leg + dorsum of foot.
- 2- sensory loss in antero-lateral aspect of leg & dorsum of foot.
- 3- motor weakness in dorsiflexion of ankle.
- 4- No loss of reflexes

NB:- If S₁ affected (in L₅-S₁ prolapse):-

- 1- pain in buttock, back of leg & thigh and, ankle & foot.
- 2- sensory loss in calf, heel & sole.
- 3- motor weakness in plantar-flexion.
- 4- Loss of reflex $\rightsquigarrow$ ankle jerk.

* Treatment :-

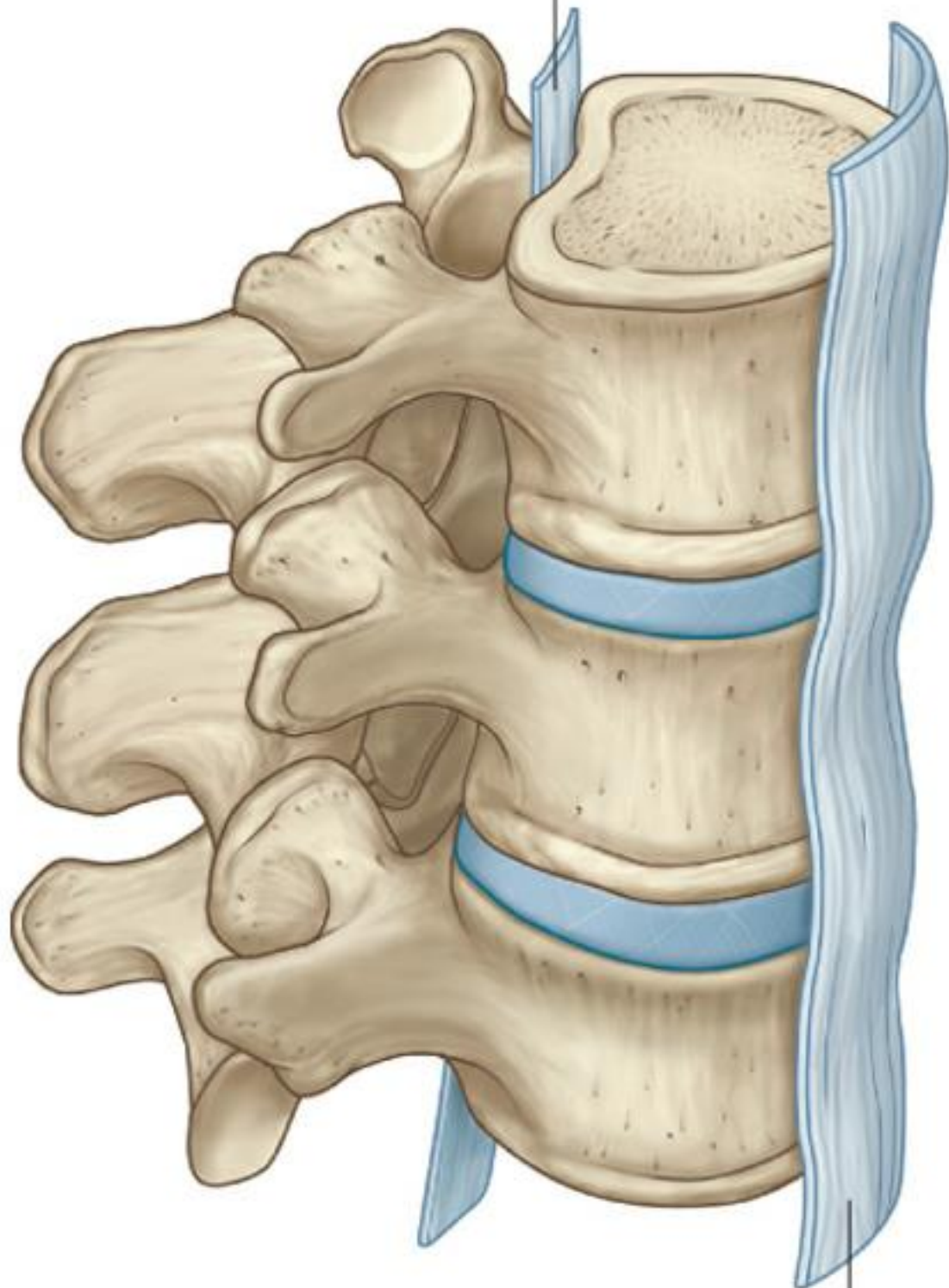
- ① conservative:- bed rest, plaster jacket or belt. ^{diazepam}
 - drugs (analgesia, antiinflam., ms relaxant)
 - intradiscal injection of fibrinolytic enz. (chymopapain).

- ② Operative (excision of prolapsed material).

- indicated if
 - sever sciatic pain interfere sleep & daily activity
 - failed conservative ttt.
 - sever neurological disturbance.



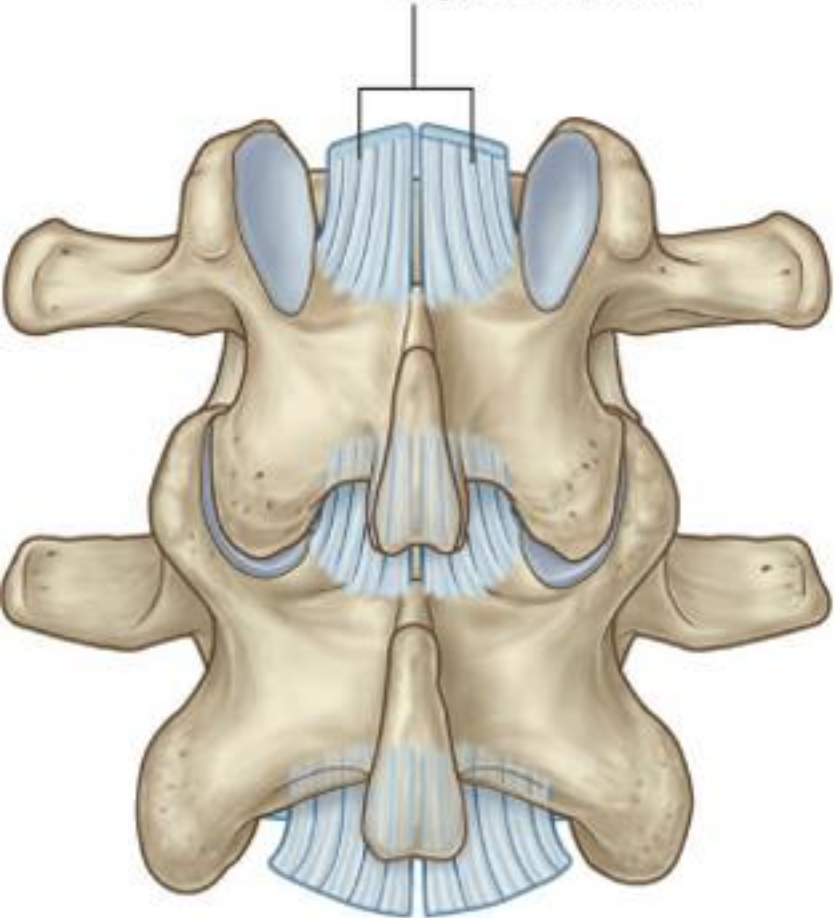
Posterior longitudinal ligament



Anterior longitudinal ligament

Superior

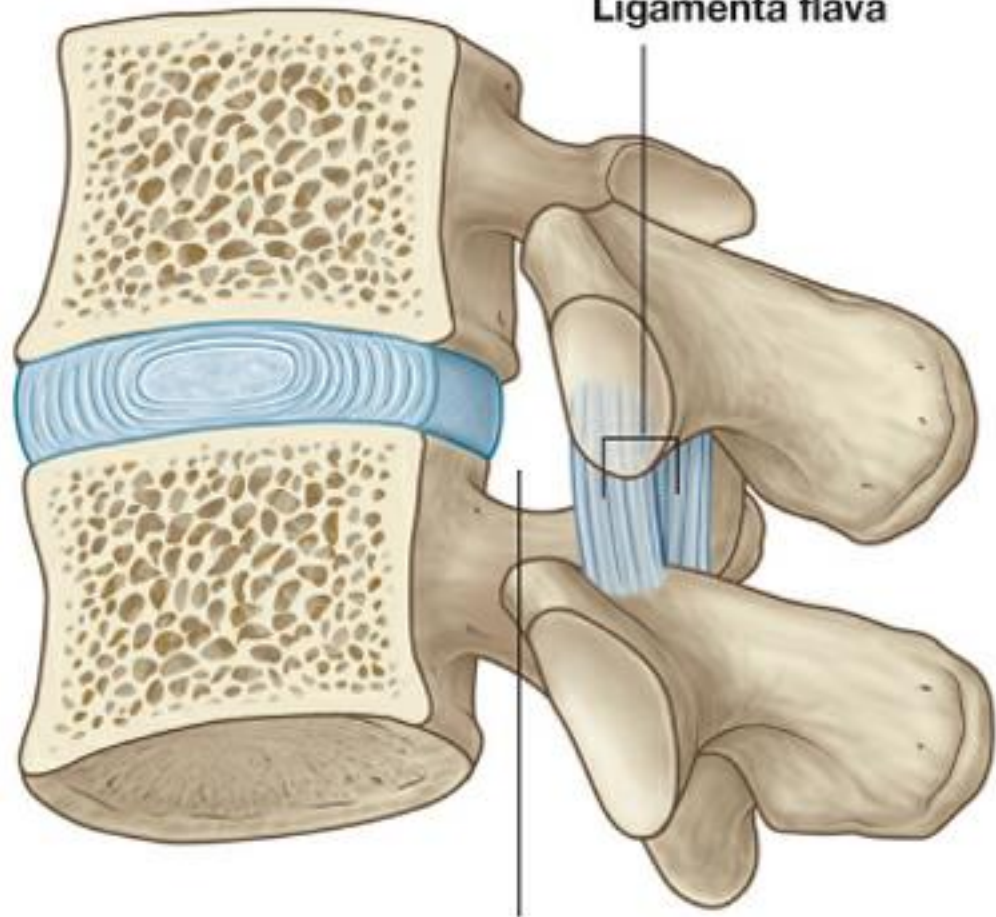
Ligamenta flava



Inferior

Superior

Ligamenta flava



Posterior

Inferior

Vertebral canal

Drake: Gray's Anatomy for Students, 2nd Edition.

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